AN IMPROVED LEVEL.

A new Patent Y Level recently introduced by W. Gardam & Sons, manufacturers of surveying and engineering instruments, of New York city, possesses many features and improvements, which makes it a superior and stronger instrument in every respect. As will be seen from the excellent engraving, the most important improvement is in the quick levelling attachment, a device which enables the engineer to set up the instrument on uneven or hilly ground, and level it almost instantly, using the levelling screws for the finer adjustment, care having been taken to construct the levelling screws so that the threads of the screw

on the working portion are entirely protected from dust, dirt, etc., there being the least liability in this case of the screws cutting or abraiding from accumulations of grit.

To enable the reader to fully understand the details of the Quick Leveller, we have appended Fig. 2, which distinctly shows the form of socket B, on which the instrument revolves, and the manner in which it is attached to the parallel plates, &c., clamping ring A, ring C, spring catch E, tangent screw H, and clamp screw G.

In using the instrument proceed as follows: First screw the parallel plates to the tripod head,

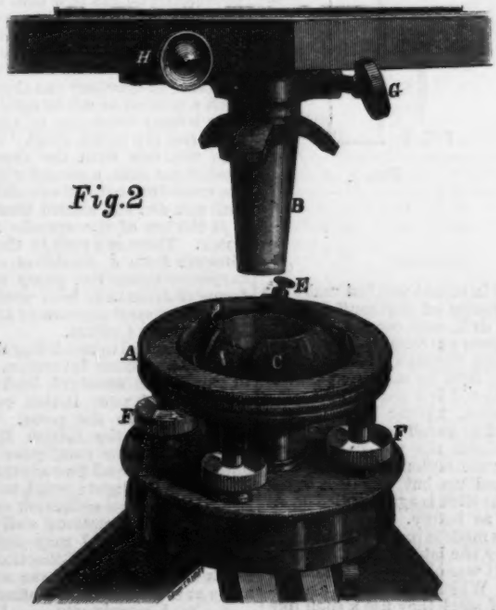

Fig.2

unscrew slightly the ring A, insert the socket B in the cavity provided for it, and bring the three flanges on socket B opposite the three openings in the ring C; then turn it in this position until the spring catch E drops over the edge of one of the flanges on socket B, which prevents it from being turned backwards, and so takes away all liability of its falling out when being carried; now screw ring A, which causes it to grasp socket B firmly, and thus holds the instrument perfectiy rigid, and it is ready for use.

It is obvious that by slightly unscrewing ring A the instrument can be tilted in any angular direction at will; the amount of friction and bearing surface is so great that there is not the slightest chance of the instrument shifting when being used. The simplicity of this device is so great that we will guarantee it cannot possibly get out of order with ordinary use and care.

The center of this instrument is made as long as possible, measuring over 3½ in., of large diameter and made of the finest composition of gun metal, possessing excellent anti-friction qualities, and is exceedingly strong.

The position of the tangent-screw and clamp is at the right hand of the observer at all times; the convenience of this arrangement is at once apparent to all those who have used the present style of level, in which the tangent is fixed to the lower part of the instrument, thereby necessitating the use of the right and left hands alternately, in effecting the necessary adjustments.

The telescope of this new Y level is long and powerful, magnifying over 32 diameters, extra large object-glass, giving an abundance of light, large and flat field of view, showing objects erect, rack motion for focusing at both eye and object ends, draw-tube provided with anti-friction bearings, so that it cannot possibly wear loose and affect in any way the line of collimation; line of collimation adjusted by us for all distances, telescope provided with an adjustable stop for bringing cross-wires truly vertical and horizontal.

In adjusting this level the shade tube is placed over the object glass, and the telescope focussed for a mean distance, so that it is in perfect balance each way from the center of the instrument; by our attention to this important point in adjusting the level, the greatest degree of accuracy is obtained.

Also the distance between the line of collimation and the point of revolution of the instrument on its center is decreased so that it measures only 3 inches.

The telescope is provided with a very accurately-ground spirit level, 8 in. long, to which a fine graduated scale is attached, care being taken to suspend it from the telescope, with solid castings of gun metal. Heretofore the suspenders have been usually made in two pieces, soldered together, and in case of a sudden jar they very often separate.

Careful attention has been given in designing this instrument, to use ribbed metal entirely, thereby reducing the weight, and at the same time strengthening those parts that are most liable to receive severe strains; also, the material used is of the finest composition of bell metal, and it will be guaranteed free from defect; in fact, no pains have been spared to make this instrument perfect as far as possible.

Finally, the attention of the engineer is called to the fact that the Patent Quick Leveling device can be applied to any other instrument, whether level or transit, at a moderate cost. For further information apply to the sole patentees and manufacturers, W. Gardam & Sons, 96 John street, New York city.

OUR RAILROAD SYSTEM.

Advance sheets of the forthcoming volume of Poor's "Railroad Manual of the United States," have been issued. The year 1881 was one of extraordinary activity in railroad affairs. Within the year 9,358 miles of railroad were built. The greatest mileage for any previous year was 7,379 miles, in 1871. The cost, at $25,000 per mile, of the lines constructed during the year was $233,750,000. In addition, at least $75,000,000 were expended on lines in progress and $100,000,000 in improving their tracks, in building new stations, and in adding to their equipments. The total amount expended in construction during the past year was, in round numbers, $400,000,000. Up to the 1st of June, 1882, 3,677 miles of line were opened, against 1,734 for the same period in 1881. The same rate of increase will not be maintained for the remainder of the year, but the aggregate of new mileage is not likely to be much short of 10,000 miles. It is certain, says the Manual, that for a long time to come a much greater extent of mileage will be constructed annually than was constructed in the past or than will be constructed in the present year. The earnings of all the roads in operation the past year equaled $725,325,119, being an increase over the previous year of $110,000,000—the rate of increase being very nearly 16 per cent. The earnings equaled $13.60 per head of our population. Their net earnings were $276,654,119, an increase of $21,500,000 over those for 1880. Their current expenses were $449,565,071. The amount of interest paid during the year on their funded debts was $128,887,002; the amount paid in dividends was $93,344,200, against $77,115,411 for 1880. The cost of operating our railroads for the year was $449,565,071, or 62 per cent. of their gross earnings. The total amount expended in the construction of new lines and in operating and improving the old ones was over $750,000,000—the greater part of this vast sum being paid in wages. The number of persons employed in operating them the past year averaged fully 12 to the mile of operated line, or 1,200,000 in all. The number employed in the construction of our railroads equaled 400,000, increasing the total number of employés to 1,600,000, or about one thirty-second part of our population, estimated at 53,200,000. The tonnage transported on all the railroads in the country in 1881 cannot have been less than 3,500 tons to the mile, or 350,000,000 tons in the whole. The exact amount cannot be given from the want of returns from a large number of companies. The tonnage transported by the railroads making return to the Legislature of Pennsylvania in 1881, and having a mileage of 19,244 miles, equaled 133,410,302 tons; the average being very nearly 7,000 tons to the mile, the average for the whole country may be estimated at one-half the average for that State. At an assumed value of $50 per ton, the value of the tonnage moved on all the railroads of the United States the past year, less one-third for duplication, was, say, $12,000,000,000, or more than $300 per head of our whole population.

Thirty years ago the tonnage of all the railroads in the United States did not equal one-half that of the Erie or New York Central Railroads at present, nor one-sixteenth that of the total now moved. The value of the tonnage of 1851, at $50 per ton, did not exceed $250,000,000, or only $10 per head of population, against a value $12,000,000,000, or more than $200 per head, in 1881. A number of carefully tabulated statements are given to show the good effects of railroads upon the agricultural development of the West in new States and Territories, as well as upon the imports and exports of the entire country. An increase of exports in 10 years is shown to the amount of $447,000,000, of which $330,000,000 is said to have been made up of the products of the Western States, these being

almost wholly due to the construction of railroads within them.

Endeavoring to show the "utter groundlessness" of the charges of monopoly made against railroad companies, statistics are given making comparisons between the freight rates of 1881 and those of 30 years ago. The New York Central and Hudson River Railroad's operations are quoted: "In 1855, immediately after its consolidation, this road moved 670,073 tons of freight at a charge of $3,758,320, and at a cost of $1,539,912, the net being $2.215,408. The tons moved one mile equalled 114,827,793; the charge was 3.270 cents; the cost, 1.341 cents; the net, 1.929 cents per ton per mile. In 1881 the same road moved 11,591,379 tons of freight at a charge of $20,736,750, and at a cost of $14.913,213, the net being $5.823,537. The number of tons moved one mile equalled 2,646,814,098; the charge was .780 cent; the cost, .562 cent; the net, .218 cent per ton per mile. The increase in tons moved on this road from 1855 to 1881 was 10,921,306, the rate of increase being in round numbers, 1,700 per cent. The increase in service performed —tons moved one mile—was 2,531,986,818 tons, the rate of increase equalling 2.200 per cent. The earnings from freight increased at the rate of 480 per cent., such rate equalling only one-fourth that of service performed. The cost of movement per ton per mile was only about one-third that for 1855, while the net per ton per mile equaled only about one-ninth that for 1855. Had the rates charged in 1881 equalled those of 1855, the gross earnings from freight the past year would have been $86,450,817 in the place of $20,736,749, the amount actually received. Had the same net rate been maintained, the total net for 1881 whould have been $52,875.036, in place of $5,823,537, the amount actually received. Charges have been reduced to rates that were believed to be impossible a few years ago. In 1872 it cost the New York Central 1.129 cents to move a ton of freight one mile. In 1881 it received only .783 cent for a similar service. In its reduction of charges the Central Railroad only represents the entire system of the country. The New York, Lake Erie and Western Railroad, in 1855 moved 842,055 tons of freight at a charge of 2.424 cents and at a cost of 1.155 cents per ton per mile. In 1881 it moved 11,086,828 tons at a charge of .805 cent. and at a cost of .529 cent per ton per mile. Had it charged as much per mile in 1881 as it did in 1855, its receipts from freight would have been $47,101.811, in place of $5,473,313, the amount actually received. The Pennsylvania Railroad moved, 1855, 365,006 tons of freight at a charge of 2.746 cents, and at a cost of 1.662 cents per ton per mile. In 1881 it moved 18,229,365 tons at a charge of .799 cent, and at a cost of .437 cent per ton per mile. Had it charged the same rates in 1881 that it did in 1855, its receipts for the past year would have been $73,195,832, in place of $10,801,089, the amount actually received. The charge in 1881 was .87 cent less than the cost of movement in 1872. The result of reduced charges is seen in the enormous increase of freight and of income—quantity making up for reduced rate of profits."—*N. Y. Times.*

ARE CANALS LONGER USEFUL?

The Hennepin Canal scheme has been suspended by the action of the Senate until a survey can be made and estimates of cost, capacity and various methods of management submitted. Of course, the project is not dead, but sleeping, and will be pushed in the near future with increased vigor. As the public will undoubtly be called upon to pay for this alleged improvement, it may not be amiss to inquire whether canals are not like last year's almanac—out of date.

Pennsylvania's canals, with but few exceptions, are only remembered in history, and nearly all the lateral canals in New York are being abandoned, while the Erie Canal, which was for many years the main artery of internal commerce for the Empire State, is only a burden and expense to the taxpayers. Of course, it is claimed, with some show of truth, that the canals of this State were gobbled up by the railroads and discontinued to enable them to rid themselves of a dangerous rival, but that if given a fair chance they could have maintained themselves in competition with the railroads. But late experiments, under the most favorable circumstances, have led to the conclusion that canals cannot compete with railroads in the carrying of freight, even in the matter of cheapness, much less in dispatch and promptness of delivery.

The Delaware & Hudson Canal, which extends from Honesdale, in Wayne county, to Rondout, on the Hudson river, and was built exclusively for the coal-carrying trade, has been one of the most profitable waterways of the kind in this country. It was the property of a private corporation, which run it on business principles, simply to make money. Its business has always been immense, being measured only by its capacity, and there is no prospect of a diminution of that business. But this company has been compelled by their increasing traffic to use railroads for their Western and Northern trade, and, as a result of actual experiments upon the relative cheapness of the two systems, have demonstrated that the railway is the cheapest and are now making the necessary surveys with a view to the filling up of their old canal bed and laying a railroad track in its place, which will be done probably within the next year.

This is a case in which the relative merits of the two systems have been subjected to the fairest kind of a business test and the canal found wanting. In the light of this experiment it seems the sheerest folly to advocate the building of any more ordinary canals as a means of compelling cheaper freights. If the government is to enter into the tranportation business with a view to regulating the price of freights in the public interests it had better build railroads.—*Philadelphia Times.*

TWO PRIMITIVE DRILLS.

Engineers who are in the habit of grumbling at the imperfections of even the best modern tools may perhaps feel interested in seeing the sort of apparatus in use amongst the workmen of barbarous and semi-civilized nations. Fig. 1 in the illustration subjoined represents a form of drill which is in very general use in the East, and which is, we believe, also employed in this country by the ingenious artisans who devote themselves to the riveting of broken china and glass articles. We have

FIG. 1.

FIG. 2.

ourselves rarely seen it in actual use, but make the statement on the authority of Holtzapffel. It is known as the pump drill, and consists of a rod carrying a drill at its lower extremity. At the upper part is a cord passed through a hole, the two ends of the cord being held by a stick as shown. About the centre of the rod is a disc which serves as a flywheel. The cord, having been twisted round the rod, is caused to unroll by pulling down the cross stick, which sets the rod in rotation, which is continued by the action of the fly until the cord is again wound up, but this time in the contrary direction. The stick is again pulled down and the drill rotated as before. The tool from which our drawing was made is in the ethnological collection bequeathed by the late Henry Christy to the British Museum. It was obtained from one of the Andaman Islands. When the natives are unable to obtain a piece of steel they use a shell like that represented in Fig. 3. The total length is 2 ft. 7 in., the diameter of the fly being 4½ in.

The specimen shown in Fig. 2 is of considerable interest and seems to show that the well-known Archimedian drill of the tool shops is after all of much earlier date than is usually supposed. Our engravings is prepared from a specimen now in the Indian collection at South Kensington, but we have been unable to obtain any information as to its origin. The material is hard wood of a dark color; the screw is treble-threaded, the pitch being 5 in., and the diameter 1⅛ in. The total length is 1 ft. 8 in. The nut is not threaded, two pegs, the ends of which are shown dotted, serving to set the screw in rotation as the nut is worked up and down.

The authorities at the Indian Museum are unable to give any information as to the history of this interesting tool. They cannot say from what part of India it came, nor when it was added to the collection. We first saw it about seventeen years ago, when the museum occupied the upper story of the India Office at Whitehall, and ever since we have been in the habit of instancing it as a remarkable example of the inventiveness of the Hindoo. Further consideration of the matter has, however, led us to think that after all we may be mistaken, and we should be glad of the assistance of our indian readers to clear up the matter.

There is no doubt whatever that this specimen came from India and that it is of native workmanship. But it is not quite certain that it was not a copy of a drill which had found its way from Europe. The Archimedian drill was invented by a Mr. MacDowall, of Soho, who was rewarded by the Society of Arts in 1845. The earliest published description with which we are acquainted is contained in Haltzapffel's "Turning and Mechanical Manipulation," vol. iii. p. 1008.

If the specimen figured be a genuine Oriental tool, it is, like everything in the East, most probably of high antiquity, and is of great interest as showing the condition of the mechanical arts in our eastern empire. It will be noticed that the screw is left-handed, contrary to the usual direction of the threads of screws. That is considered by Professor Reuleaux as furnishing some evidence of antiquity ("Kinematics," p. 223).

But against this view we must point out that many of the drills which are found in the tool shops are fitted with screws of the same kind. We have made an extensive search in books of travel but have failed to find a description of this form of drill. It would be interesting to know whether it is known to be in use in any part of India or the adjacent countries.—*Engineering.*

TO THE EDITOR OF ENGINEERING.

SIR,—In reference to your valuable article on primitive drills, perhaps the few notes on the subject which follow may interest some of your readers. The earliest form of drill was a pointed stick twirled between the palms of the hands. This was improved upon by placing a socket at the top so that downward pressure could be applied, and using a cord wound round the stick once or twice for producing rotary motion. The cord drill, however, requires two persons to work it (unless the socket be held between the teeth, as done by the Esquimaux), and this difficulty was overcome by fastening the ends of the cord to a bow, which could be worked with one hand whilst the other held the socket. The last form of drill is almost exclusively used in Egypt, Persia, and India. The pump drill referred to in your article is an improvement on the bow drill in that the rotary motion and downward pressure can be produed simultaneously with one hand whilst the other holds the object in which the hole is to be bored. Perhaps it may be used by china menders for that reason, as the piece of crockery can thus be easily adjusted to such a positon as not to split. The pump drill is very largely employed in China, and is often of great size (up to 3ft. long). There are three varieties, viz., one with the cross-bar hanging loose against the drill, a second sort with a hole through the cross-bar so that it can slide up and down on the drill spindle, and a third kind where the flywheel is at the top of the spindle instead of half way down. There is a cast in the South Kingsington Museum from a mediæval sculpture, showing a carpenter using the pump drill. All the above forms of drills have been used for producing fire, and a very good account of this will be found in Tylor's Early Culture.

I am inclined to think that the Archimedian drill is really a modern invention, as it is not described in any of the standard books on travel; but perhaps some of your Indian correspondents might enlighten us on the point. The anthrcpological collections in the British Museum are so badly arranged and the catalogues so meagre that it is hopeless to try and find anything there even on the days when it is light enough to see the specimens. A really exhaustive collection of the primitive tools used by various nations well classified would be most instructive. I may mention in conclusion that the Pitt Rivers Collection at South Kensington is the only one where an attempt has been made at scientific classification.

I remain, etc., J. ROMILLY ALLEN.

5, Albert-terrace, Regent's Park, June 10, 1882.

THE CABLES TO CENTRAL AMERICA.—The cable steamers Retriever and Silvertown have landed the shore ends of the cables on the coasts of the Central America states, and will leave Tehuantepec on Thursday, laying the cable southward to Panama, thus completing telegraphic communication from Valpairaso northward. The officers, crew and cable staff are all in good health. The cables will be open to the public in August.

THE HISTORY AND STATISTICS OF AMERICAN WATER-WORKS.

BY J. JAMES R. CROES, M. AM. SOC. C. E.

(*Continued from page* 229.)

CCCLIV.—WINCHESTER, MASS.

Winchester, Massachusetts, in lat. 42° 25′ N., long. 71° 10′ W., is on rolling ground.

It was incorporated as a town in 1850.

Water-works were built by the town in 1878 after plans of Walter H. Sears, C. E., taking the supply from a neighboring stream which was impounded by an earthern dam with stone masonry heart wall, 30 ft. high and 600 ft. long, forming a reservoir of 63 acres area and holding 260,000,000 gallons at 121 ft. above the town. Distribution is by wrought-iron and cement pipe, of which there are in use 21 miles of from 12 to 4-in. diameter, with 76 fire hydrants, 81 gates and 539 taps. One meter is in use. The town contributes $15 per year for each hydrant. Service pipes are of rubber-coated iron, which does not give satisfaction; cement-lined wrought-iron pipe are to be used hereafter. The population in 1880 was 5,806. The daily consumption is not stated.

The works have cost $165,000. The bonded debt is $160,000 at 7 per cent. interest.

The cost of maintenance is not furnished. The receipts in 1881 were $9,457.40.

The works are managed by three water commissioners. W. T. Dotton is the Superintendent and Mial Cushman the Water Registrar.

CCCLV.—CAÑON CITY.

Cañon City, Colorado, in lat. 38° 40′ N., long. 105° 18′ W., is at the mouth of the grand cañon of the Arkansas River, in a park or valley, extending about 40 miles from the base of the mountains toward the north, south and east.

The town was settled in 1858 and incorporated in 1872.

Water-works were built by a private company in 1880, after plans of W. K. Johnson and under superintendence of Daniel Caird, taking the supply from a well or filter gallery, 25 by 75 ft. and 11 ft. deep, in the saturated gravel, near the river bank. The daily yield is about 500,000 gallons.

The water is pumped by a Knowles duplex engine of 1½ million gallons capacity, with a reservoir 35 by 100 ft. and 6 ft. deep, excavated in the limestone, on a ridge 150 ft. above the pumps and the city. In case of fire, the reservoir can be cut off and water pumped directly into the mains.

Distribution is by 5 miles of cast-iron pipe, of from 10 to 4-in. diameter, with 21 fire hydrants, 11 gates and 200 taps. The city pays $75 per year for each hydrant. Service-pipes are of galvanized iron.

The population in 1880 was 4,000. The daily consumption is 400,000 gallons.

The capital stock of the company is $50,000. The works have cost $75,000. There is a bonded debt of $20,000, at 8 per cent. interest. The expenses in 1881 were $2,000. The receipts are not given.

Orson G. Stanley is the Superintendent.

CCCLVI.—SEWICKLEY.

Sewickley, Pennsylvania, in lat. 40° 35′ N., long. 8° 10′ W., is on the Ohio River.

Water-works were built by the borough in 1874, after plans of Edeburn and Cooper, taking the supply from springs which have a water-shed of about one-third of a square mile. The water is conveyed from the springs, 375 ft., by a 15-in. earthenware pipe, to a reservoir holding 4,000,000 gallons, built in excavation and embankment, lined with puddled clay and brick pavement, and 100 ft. above the town.

Distribution is by 10 miles of cast-iron pipe of from 12 to 3 in. diameter, with 48 fire hydrants, 40 gates and 400 taps. Lead and galvanized iron service-pipes are used.

The population in 1880 was 2,054. The daily consumption is not given. The works have cost $75,000. The bonded debt is $60,000 at 8 per cent. and $14,000 at 6 per cent. interest. No further financial statements are furnished.

J. Boobyer, Jr., is the Secretary of the Water Commissioners, and John Patton the Superintendent.

[TO BE CONTINUED.]

The receipt of statistics as follows is acknowledged with thanks. From Orson G. Stanley, Esq., statistics of the water-works of Cañon City, Colorado. From Mial Cushman, water registrar, statistic and water rates of water-works of Winchester, Mass. From A. G. Moore, Superintendent, 42d report of Cincinnati, O., Water Department, for 1881. From J. Boobyer, Jr., Secretary, statistics of water works of Sewickley, Pa. From J. C. Willett, statistics of water-works of Frederick, Maryland.

THE NEW TELEGRAPH line of the Cherokee Railroad between Cedartown and Cartersville, Ga., is now in active operation.

CORRESPONDENCE.

CHIEF ENGINEER OF WATER-WORKS, ETC.

EDITOR ENGINEERING NEWS:

I have been asked to procure the names of the "Chief Engineers of Water-works" in some of the prominent cities of the United States, with the information as to whether they are "Mechanical," or Civil Engineers, and to which of the two classes do hydraulic engineers belong. I know of no better or more impartial channel through which to get the information required than through the medium of your paper (as an exterior source will only be credited), and respectfully request you to publish such data relative thereto as you may have at command, and without reference to the party making request and thereby oblige

Yours truly,

A. D.

[To comply with the above request involves no small amount of labor, the time for which we feel quite unable to give personally. We must refer our correspondent to "The History and Statistics of American Water-works" for the names of the chief engineers of water-works. As to whether they are "mechanical" or civil engineers, can only be learned by personal correspondence with each one. We think that "hydraulic" engineers may be, and necessarily must be, to some extent, "mechanical" engineers, but they are certainly included in the general term of "civil engineers," of which profession their specialty is one branch. —ED. ENG. NEWS.]

PANAMA CANAL SERVICE.

INTERNATIONAL R. R. CO., LAREDO, TEXAS, Thursday, July 6, 1882.

EDITOR ENGINEERING NEWS:

Perhaps you would be good enough to inform me what the name and address of the Chief or Engineer in charge of the works at the Panama Canal is. Also if Junior Engineers or draughtsmen would be likely to get employment there. And oblige

Yours, very respectfully,

S. W. S.

[M. Reclus, the Chief Engineer, has recently gone to France. We do not know who is in charge during his absence. We do not know what the chances for employment in Panama are; probably they are good, as the death rate is high and the work must be kept in progress.—ED. ENG. NEWS.

ENGINEERS' SOCIETIES.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

At a meeting of the Society held on July 5, a paper by S. S. Haight, member Am. Soc. C. E., subject, "Accuracy of Measurement as Increased by Repetition," was read. The substance of this paper has already been published in ENGINEERING NEWS, pages 62 to 143, Vol. 8.

The following were elected to membership of the Society:

MEMBERS.

Peter C. Asserson, Civil Engineer, U. S. N., Norfolk, Va.; Edward Cook Burns, U. S. Assistant Engineer, Detroit, Mich.; David Dexter Clarke, Asst. Eng. Northern Pacific R. R., New Tacoma, Wash. Ter.; William Hooper Dennis, U. S. Coast and Geodetic Survey, Washington, D. C.; William Ludlow, Captain of Engineers, Bvt. Lt.-Col. U. S. A., Philadelphia, Pa.; M. William Mansfield, Engr. Maintenance of Road Cincinnati and Muskingum Valley R. R., Zanesville, O.; William Abbott Pratt, Engineer Ohio and Baltimore Short Line R. R., Connellsville, Pa.; Nathaniel Chapin Ray, Asst. Eng. Union Pacific Rwy., Sugar Loaf, Col.; Gen. William Starke Rosecrans, San Francisco, Cal.; William Harrison Smith, Res. Eng. New York, West Shore and Buffalo R. R., Oneida, N. Y. Junior, Frederic Nicolas Blanc, Civil Engineer, New York City.

A TEXAS CLOUDBURST.

A CORPS OF ENGINEERS CAUGHT NAPPING IN BUCK CREEK VALLEY.

Some ten or twelve days since Captain Merrill's corps of engineers and assistants were camped in the valley of Buck creek, in Childers county, Tex. Their tents were set 100 feet from the dry bed of the creek. This creek was about twelve feet deep from the level of the valley on either side of the bank. The valley is nearly a mile wide, but the high lands curved in close to the place where the camp was pitched, and the valley widened on the opposite bank. The night was clear, and no cloud in the distance betokened a rainfall. The boys staked their ponies near by, turned their mules loose, and laid them down to sleep in their tents. About midnight one of the boys felt water at his feet. Springing up he saw the water coming, and, yelling like a savage giving his war-whoop, roused his companions. In less than a minute they were standing in water up to their waists. Knowing to which side of them was the hill, they rushed wildly through the water and succeeded in gaining a safe foothold. The water rushed by them, covering the entire valley to a depth of six feet, and carrying away all the tents and baggage. The pony was saved by one of the boys cutting the stake rope as he passed him, he fortunately having gone to bed with his pants on. Most of the boys were in their night clothes, and a solemn set they were. The sudden rise of water was caused by what is known as a "cloudburst" on the head of the stream, some twenty or thirty miles away. Any number of cattle were carried down stream, but most of them finally escaped.—*Clay County Shield.*

TO WHOM HONOR IS DUE.

Mr. James R. De Remer, principal assistant engineer of the Denver & Rio Grande Railroad, has resigned his position, and is receiving much praise from the press and public. He deserves all the good words said of him, for he has been a faithful servant of the company and has done a work in which the entire traveling and commercial public is interested. Mr. De Remer is, by the way, one of a class of men who have not received sufficient encouragement at the hands of the public of the Rocky Mountain West—one of that little army of unassuming, independent and quiet civil engineers, who are seldom heard from and far more seldom seen, whose work speaks for itself, but speaks a language which is not always understood by those who reap the benefits, and not half appreciated by those who do understand it. Without the aid of the science which these men are able to bring to their assistance, the money of Wærrishoefer and Vanderbilt and Gould would be of no avail in the building of railroads throughout the country. They are a necessity in the construction of all railway lines, however level and smooth the country. If needed in the work of laying out the roadways of prairies and plains, how much more are they an essential in the work to which they are called in the Rocky Mountains. Standing at the proper place in Denver on a clear day one can have a view of the great continental range from the Black Hills to the Spanish peaks. Between these two points the main portion of our trans-continental traffic is to be carried on. The principal public highways of the nation and of the world now run and are expected to be built across this barrier. What is the barrier? Nothing less than a solid pile of granite—a rock wall averaging no less than half a mile in height and at least 200 miles in width, if piled in compact form. Fortunately it is broken here and there by the force of the waters, which, in seeking their outlets to the seas below, have worn deep, rugged and torturous crevices into the stone. It is through these crevices that the railroads have expected to find their way—through defiles, which, in some cases, had never been trod by human foot until the bold forerunners of the iron horse marched in with rod and chain to find their own way and to mark out that for the millions of others to follow. So far no task has presented itself which has not been overcome. Picking their way with the caution of science they have not only succeeded in passing hitherto impregnable barriers, but have staked the way, have marked the ledges on which railroad tracks could be hung and outlined the curves and grades over which entire trains could pass. They have given us through lines on the north and south of us. In Colorado they have found a way over the Sangre de Cristo range, over Mosquito Pass, through Toltec gorge, through Grand, Clear Creek and Platte cañons, and two lines have been lifted over the perilous passes to the Gunnison. They have built a line on the very cliff sides from Black Hawk to Central. They are about to clamber over the mountain tops near Georgetown, and the deep defiles of the wild Indian country in the west, so deep and ugly as to have never been explored even by the agile aborigine, are rapidly making way for the approach of the railroad locomotive. It is safe to say that in the last five years seven hundred miles of railroad have been built in the mountains of Colorado, and almost every cañon has been explored to make places for other stretches of the iron ways. It is the civil engineers, such as De Remer, McMurtie, Blickensderfer, Evans, Robinson, Lowrie and Captain Berthoud, who have made this progress possible, shirking no hardship and courting no notoriety, content in doing the best they can for the accommodation of the world and adding their mite to the accomplishments of the exact sciences. They deserve more recognition than they have so far received.—*Denver Times, 5th.*

ENGINEERING NEWS
AND
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Tribune Building, New York City.

GEO. H. FROST.....EDITOR AND PROPRIETOR.
S. D. V. BURR.....ASSOCIATE EDITOR.

SATURDAY, JULY 15, 1882.

EDITORIAL ANNOUNCEMENTS.

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Articles for Publication in the current number should be received at the office of publication not later than Thursday morning, and advertisements not later than Friday noon.

Correspondence upon subjects which naturally belongs to the province of this journal is solicited.

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NOTICES OF MEETINGS.

AMERICAN INSTITUTE OF MINING ENGINEERS.

COLORADO MEETING.

Programme.

Saturday, Aug. 19—In Denver. A brief preliminary evening meeting, at which the Institute will be received by the citizens of Denver.

Monday, Aug. 21—Visit to Black Hawk and Central, with an evening session at Central City.

Tuesday, Aug. 22—Georgetown. Idaho Springs. Return to Denver in the evening.

Wednesday, Aug. 23—Leadville, going over the South Park Railroad. Evening session.

Thursday, Aug. 24—Excursions to the Leadville mines.

Friday, Aug. 25—Excursions to the Leadville smelting works, reaching Pueblo at night.

Saturday, Aug. 26—Pueblo Iron and Steel Works, and Mather & Geist's Smelting Works. Colorado Springs and Manitou in the evening.

Sunday, Aug. 27—Colorado Springs and Manitou.

Monday, Aug. 28—Return to Denver. Evening reception.

Tuesday, Aug. 29—Argo Smelting Works. Golden and its smelting works. Subscription dinner.

Besides these excursions, facilities will be afforded those who desire to see the iron and coal mines of Colorado. And for those who can extend their visit, an excursion to the San Juan district will be organized.

Arrangements are being made with the railroad companies for reduced rates to members of the Institute and ladies accompanying them. When concluded, a circular will be issued informing members of the expenses from different points to Denver and return. These rates will probably not exceed two-thirds the regular rates, or about $60, plus Pullman car special rates, from New York to Denver and return. Special facilities are courteously offered by the roads in Colorado for the excursions of the Institute.

Persons proposed for membership have the same privileges as members with regard to the meeting and excursions.

As usual at the meetings of the Institute, ladies are expected to be present. Seventy-seven members with forty-three ladies have already signified their intention of being present at the Colorado Meeting, and it is expected that the attendance will greatly exceed these numbers.

The unusual attractions offered by the mining regions of Colorado are increased at this time by those of the Denver Exposition of mining appliances, minerals, etc., and by the unusual facilities offered for examining mines and works, and acquiring information concerning them.

The representatives of several foreign kindred societies are expected to be present.

Members who purpose attending this most interesting meeting should at once write the secretary of the Institute, who has to notify the railroad companies of the number of tickets required, and the names of those entitled to the special rates offered. They are also requested to inform the secretary promptly of their intention to read papers at the meeting.

Prof. W. I. Marshall, who is well known by his lectures on the wonders of the Geyser Country, offers to conduct a party of not less than eight, nor more than twenty-five, through the Yellowstone National Park. This trip would occupy from twenty-six to twenty-nine days from Denver to and through the Park and back to Denver. The greater part of this time would be spent "camping out" in the Park. The expenses of this round trip are estimated at from $275 to $300 for each person. Full information concerning this trip may be obtained from Prof. W. I. Marshall, Fitchburg, Mass.

R. P. ROTHWELL, President,
27 Park Place, New York City.

T. M. DROWN, Secretary,
Easton, Penn.

THE RIVER AND HARBOR APPROPRIATION BILL.—The total amount appropriated by the House bill was $17,367,875. The Senate has now passed the bill after having increased it to $20,924,175.

THE *Annales des Ponts et Chaussées* for May contains an article on the Electric Light in Light-Houses, one on the Distribution of the Water in Irrigation Canals, and a Critique on Baker's paper, Actual Lateral Pressure of Earthwork.

IN sending postage stamps for Greene's Graphical Analyses of Bridge Trusses (of which we are selling about twenty-five a week) the *two-cent* stamps are most acceptable, since we have several months' supply of other denominations on hand, and these are of use in sending out our foreign mail, each paper having to be prepaid with a two-cent stamp.

THE Transactions for 1881 of the Society of Engineers is received. It is well bound and well printed, octavo volume of 208 pages, uncut; its contents are as follows: Inaugural Address of the President, Charles Horsley; Gas Engines, by Chas. Gaudon; Illumination by Means of Compressed Gas, by Perry F. Nursey; On Floating Docks, by John Standfield; The Prevention of Smoke, by A. C. Eugert; Vacation Visits; Iron Roofs, by Arthur T. Walmisley; On the Arrangement, Construction and Machinery of Breweries, by W. Barnes Kinsey. The volume is for sale at $5.00.

THE greatest naval display of modern times has just taken place in the roadstead of the historic city of Alexandria, Egypt. Emboldened by the apparent delay of the European powers, especially England, in protecting their interests, the vain-glorious Arabi Bey defied them in the repair and occupation of the forts protecting the city, against the repeated warnings of the English Admiral. The terrific execution of the great guns from the war vessels in the bombardment of the 12th must have brought conviction to the minds of the Egyptians, while it illustrates the wonders of modern naval gunnery, and possibly suggests the danger that menaces our own rich and wholly unprotected sea-coast cities.

THE present military operations before Alexandria bring once more very prominently into view the wonders of the telegraph. Every movement is promptly cabled to America by the newspaper correspondents, and in New York the news is bulletined at every office several hours before it occurred. The telegraph ship Chiltern fills a prominent place in the action, and her every movement is duly chronicled. In fact, without the telegraph, the bombardment of Alexandria would not have occurred so soon, if at all, while to the outer world weeks must have elapsed before the news was communicated.

In answer to a correspondent, the N. Y. *Sun* gives the following brief history of the "Egyptian Question," which we reprint, since it cannot fail to be of interest to our readers:

"The present sovereign of Egypt, Mohammed Tewfik, is nominally the viceroy of the Sultan of Turkey, of whose dominions Egypt is theoretically a part. By various firmans or decrees he enjoys the privileges of an independent hereditary monarch, with the Persian-Arabic title of Khidiv-el-Misr, or King of Egypt, popularly rendered by "the Khedive." As such monarch he and his predecessors have contracted various public debts, a large portion of which are held by British and French subjects, and for the better securing their payment Tewfik placed, in 1879 and 1880, the management of the Egyptian finances in the hands of two Comptrollers-General, one appointed by Great Britain and one by France, virtually constituting them his administrative officers. Against this management Arabi Bey, representing the native political element of the country, rebelled, and the Khedive has been unable to subdue him. The present military proceedings have been taken by Great Britain, therefore, for the purpose of overthrowing Arabi and restoring the power to the Khedive—that is, to the English and French officials to whom he has intrusted it."

WE have more office room than we need, and offer to eligible tenants desk room or entire offices on the second floor of the Tribune building. We can sublet the two best offices in the building till May 1st next at low rates, and after that time can make satisfactory terms for tenants, as we have a three years option of our lease, and higher prices are sure to prevail another season. The rooms are new, well lighted, and in winter are heated by the lessor. They are the most eligible offices for engineers now obtainable in this city, and tenants have the full benefit of the home and foreign newspapers, books and periodicals coming into this office daily.

THE May number of the Journal of the Association of Engineering Societies has been received. Its leading paper is one by Dexter Brackett, Assistant City Engineer, Boston, Mass., entitled "Experiments Made with the Deacon Waste Water Meter System," read before the Boston Society on May 17th; it is illustrated with eight diagrams, and there are twelve pages devoted to the subject. Mr. Brackett has for many months been conducting a series of experiments with this meter for the City of Boston, and the results are given to the public in this paper. We have already described in this journal the Deacon meter and the method of using it. We therefore refer all those interested in the subject to this very complete article by Mr. Brackett. "Silt Movement by the Mississippi—Its Volume, Cause and Conditions," by Rob't. E. McMath, St. Louis, is an able paper on the hydraulics of the great river by one of its most enthusiastic observers; A. Mordecai, of Cleveland, has a paper entitled "Remarks on George Stephenson," and N. B. Wood of the same city contributes a paper on "Crystallization and its Effects Upon Iron." The price of the number is thirty cents, and can be had by addressing H. G. Prout, 12 Barclay St., New York City.

AT Lebanon, O., on the 10th, the rain came down in such torrents about 4 P. M. as to completely fill, overflow and burst a large reservoir just above the town, covering 40 acres of ground, which was formed by an embankment some 80 ft. high. The people residing in the line of danger fled to the high ground and no lives were lost. The embankment began to crumble in two places which soon became one, when the whole flood of waters came pouring out of the reservoir. The first thing it met and lifted from its moorings was an immense iron bridge spanning the creek on the Dayton pike, a few hundred yards below the reservoir. This it landed over in an adjacent lot.

Next came the houses, fences, stables and bridges below. Nothing withstood its power, and the course of its track in half an hour was a sight of sad desolation. Five bridges, including a temporary railroad bridge, were swept away. Four houses were carried down with the current, together with the effects of the occupants, and are torn to pieces and scattered along the path of the flood. Some of the houses were moved but a short distance from their foundations, but were greatly damaged, while in all the dwellings in the section flooded the water poured through, driving their occupants out upon the adjacent high grounds.

Though no lives were lost, many narrow escapes were made. The town is in darkness, the gas tank having been washed away, and the homeless families are wandering about in the fields and sediment looking for their effects. The loss to the town will not fall short of $50,000, while many poor families have lost the fruits of a life of toil.

The loss to the county and to the farmers in the valley below can not at this time be estimated. The through trains on the Cincinnati Northern will not be able to run for several days yet.

THIS has been *the* hot week of the season, probably. The temperature for the corresponding week last year ranged about 77°, this week it has been over 90° for several days, resulting in doubling the death rate, and prostrating or enervating a large number of the people who have to remain in the city. On Wednesday, which was a little more endurable than Tuesday, the mercury at

3 p. m. registered 93°, at noon it was 85°, in the following cities it was as follows:

At noon in Albany the mercury marked 76°; in Bismarck, Dak., it marked 64°; in Boston, 89°; in Baltimore, 87°; in Buffalo, 76°; in Cleveland, 80°; in Cincinnati, 74°; in Louisville only 69°, a fall of 20° in twenty-four hours; in Philadelphia, 90°; in San Antonio, 98°, and in St. Louis, 80°.

In New York there were 187 deaths for the twenty-four hours ending noon on Wednesday, of which 95 were of children less than 5 years old. The wonder is that so many of the little creatures—poorly fed, hardly cared for, and confined to the miserable, squalid apartments of the tenement districts of the city—live through the terrible siege of a summer in this over-heated, baked city. It is estimated that over 350,000 New Yorkers have gone out of the city for the heated term, and every Saturday the railway and steamboat companies find their facilities quite inadequate for the tax upon them in conveying the crowds away to spend Sunday in the mountains or by the sea shore. New York is a mass of brick, stone and iron, upon which the hot sun pours its rays till everything is baked, and the reflected heat leaves hardly a cool spot to rest in. Rain dries up as it falls on the pavements and a few minutes after it ceases all signs of it are gone. The majority of business men, however, must remain in town, and were it out for the unequalled facilities for quickly getting out into the invigorating breezes of the bay or to numberless resorts not far from the city, summer in New York would be much more unendurable than it is.

THE CINCINNATI, O., WATER-WORKS REPORT.

The report of the above Works for the year 1881, submitted by Supt. A. G. Moore, has just come to hand. The deficiencies of the pumping service are the most prominent features of the opening pages, and the superintendent italicizes the statement "that the Works, with their present limited capacity, cannot be depended upon to deliver the full supply during any future summer." This condition of things is due to the great increase in consumption of water, and the insufficiency in quantity and quality of the pumping machinery. There are not, as is usual in most well-equipped water-works, any reserves in machinery or boilers, so that what there is, is constantly in use. The actual available capacity of all the pumps is 32,000,000 gallons per day, while the maximum consumption is 38,000,000; if the highest daily consumption from both high and low services should occur in the same day there would be a deficiency of 7,500,000 gallons. The engines are not only of light construction and subject to expensive repairs and renewals, but possess defects otherwise, and are exceedingly extravagant with fuel, this item in 1881 being $69,000, of which nearly one-half could have been saved by the use of modern machinery. The principal engine is the Shield, which gives a duty less than 30,000,000 per 100 pounds of coal; the Scowden engines give about 45,000,000, the Harkness 42,000,000, and the old combination engines 46,000,000 pounds; these engines have been in use thirty-six, thirty-one, twenty-six, sixteen, and seven years, respectively; there are twenty-four boilers in seven batteries, which, like the engines, are deficient in capacity and without reserves. The superintendent gives an estimate for one engine, boiler, and boiler-house additions, *just sufficient to render the pumping plant adequate to present requirements.* Another engine of like capacity would need to be constructed in the following year. The engine recommended is of the compound condensing rotative type, with steam cylinders thirty-nine inches, and eighty-two inches to drive two single acting plungers, each of forty inches diameter and thirteen feet stroke, and in connection therewith, one compound engine (33,000,000 gallons), dry well and foundations, and other items aggregating $1,349,500, the whole expenditure being over $3,000,000, which, when completed, will have a delivering capacity, including reserves, of only about 50,000,000 gallons per day, and if the construction of these should be entered upon at once, they could not be utilized before the summer of 1884.

The population of the Highlands has increased very rapidly: eighty per cent. of the seven miles of pipe laid in 1881 was in this service. The addition to the water mains in 1881 was one hundred and ninety per cent. over those of 1880. The situation now demands increased pumping machinery and boilers; increased supply lines and new tanks with greater altitude. The superintendent recommends a new, separate stand pipe system, connected with the Eden Park reservoir for the high service, the cost, as estimated, being $394,000, and the daily capacity being 8,000,000 gallons.

Estimates for a low service system are given; the capacity being 100,000,000 daily. The Scowden estimate for the proposed Markley Farm extension is $5,725,000; the Newport plan for pumping and conveying the water from the Kentucky side above the Little Miami River is $6,381,000. Four schemes are, therefore, proposed, and it is safe to presume that Cincinnati must, before very long, engage in the construction of an additional water supply.

The bill of costs, how to raise the money, and its comparison with that of other large cities forms an interesting chapter of the report. Water supply statistics for 1880 (from ENGINEERING NEWS), of twenty-three principal cities are given in tabular form; the total cash receipts in 1881 were $515,821; the disbursements were $513,030; the revenue for 1881 per one thousand gallons of water pumped was 5.55 cents and the cost was 3.7 cents, of which 2.52 cents was for maintenance and 1.18 for interest. The value of the entire Water-works on January 1, 1882, was $6,909,556; the value of free water is $45,000 annually.

There were 7.636 miles of new pipe laid, together with 161 valves, the cost being $83,642; the gallons of water per capita (264,000 people) was eighty-seven; the average for low service was 6,056,430, and for middle service 19,476,739 gallons; the highest record was in August, the lowest in December. Thos. J. Bell's waste detector has been used with excellent results. The cost of pumping 1,000,000 gals. into Third street and Eden Park reservoirs was $18.04 of which $16.41 was for current pumping expense; deducting the expense of the high service the cost was $15.59 of which $14.40 was current pumping expense.

The subject of Smoke Prevention (illustrated), and of Contamination of River Water, from reports by Major Wm. E. Merrill, U. S. Engineer, accompanied by a map, and numerous other matters, mostly statistical, but all of interest to Water-works superintendents and companies, are treated in this able report which occupies eighty-one pages octavo, and which can probably be had by addressing Supt. Moore, Cincinnati. The labor of preparing such a document is very great and it is but very poorly appreciated. It is well for the general welfare of all large city communities that there are faithful and competent men in charge of departments like Water-works, else a sad day of reckoning for willful waste, reckless extravagance and neglect, and criminal carelessness would visit many a city without sufficient warning to be of use.

AMERICAN CONTRACTING IN BRAZIL.

It may perhaps interest readers of ENGINEERING NEWS to hear of American pluck and enterprise in successful competition with other nationalities for the construction of public works in Brazil.

The Ponte dos Remedios (Bridge of Remedios) completed a few months since, is the first and only structure of the kind ever built on the river Amazon or its tributaries; the nearest point where they have iron bridges is Ceara, many miles south on the coast.

The bridge is a Pratt Truss, one span, 125 feet clear, full width 40 feet, roadway 20 feet wide, two sidewalks, each 8 feet clear. The lower chord is of wrought bars, upper chord of channel bars. Height of truss 20 ft.; flooring about 3 ft. above lower chord. The roadway floor stringers are I iron, sidewalk, stringers wood. The roadway is floored with "Itauba" planks, 4 inches thick, 6 to 8 in. wide and 19 ft. 8 in. long. The sidewalks are floored with "Massaranduba" planks 2 in. thick. Both these native woods are very hard and durable, "Itauba" resembles American teak. The flooring of the bridge alone cost the contractors $3,000. The iron work was all in place within 6 weeks after its arrival in the port of Manaos, and was erected under disadvantages from unskilled labor, but happily without the least accident. Four ornamental iron lamp posts, each having three lights, the globes having the arms of Brazil cut on them, furnish light by the "Gas globe" system. The bridge was built to sustain a moving load of 2700 lbs. per lineal foot. It spans an "Igarapé" or arm of the river dividing two portions of the city of Manaos. The bridge takes its name from the eastern portion, called "Remedios."

The contract for the bridge was made by the Province of Amazonas with Mr. E. Backus, until recently United States Consul at Para, during the administration of the President Seur. Dr. Satyro d'Oliviera Dias, and was concluded during the administration of the President Dr. José Alarico Furtado. The design was made by C. B. Brisbin, C. E., of Lewistown, Pa., who left this country in January, 1878, as one of the engineers in the Collins Expedition to Brazil, to build a railroad on the Madeira River, and who, notwithstanding the trials and hardships of that ill-fated expedition, all the members of which, with the exception of himself, have long since returned home, has remained in the country and made for himself a name and a fame. Mr. Walter B. Bassett, of Indianapolis, Ind., was Superintendent of Construction, and went to Brazil especially for the work. The Chief Engineer for the Province is Dr. Joaquim Lacovigildo de Sauza Coelho, a gentleman of very great learning and ability. The Assistant Engineer for the Government, on the bridge, was Dr. Gregorio Tharmaturgo de Azevedo, a young military engineer of ability. The Brazilian engineers treated the American contractors with great courtesy.

Messrs. Backus and Brisbin have contracted for a Market House to be built at Manaos. The superstructure will be all of iron. The building will be very high and capable of being thrown open, the sides being composed of iron venetians. The flooring to be of blue stone. The ground plan will be 40 meters front by 41.55 meters deep. The building is to be highly ornamental, surmounted by a large eight day clock, and altogether will be one of the finest of the kind in Brazil. All material will be taken out complete from this country and England, as well as the workmen for its erection. The contract was made by the President, Dr. Jose Alarico Turtardo.

Manaos, the capital of the Province of Amazonas, Brazil, a city of 6,000 inhabitants, is situated on the Rio Negro, about 8 miles from its conjunction with the Solimoes or Amazons. It is the principal city on the Amazons above Para, and is a great center for "borracha" (rubber) "Brazil nuts," "piassuba," "cumurn," oils, dies, hides, etc. At present there is a direct line of steamers to Europe, making five trips a year, and a direct line to New York making three trips a year, both subsidized by the Province. The trade is large and increasing rapidly and Manaos is destined to become an important center for the trade of the interior of Brazil and the adjoining countries.

C. H.

POLLUTED SCHUYLKILL WATER.

Philadelphia is having something of a scare this week over the prospect of having to contend with a volume of polluted water which in its course down the Schuylkill must soon reach the pumping station of their water-works at Fairmount. At Reading and Pottstown the fish were dying in considerable numbers from the effects of the water, and the water-works authorities at other points lower down were watching with a good deal of interest for the signs of pollution or poisoning. Superintendent Slingluff of the Norristown Water-

works thinks there is no occasion for a scare, and he ascribes the whole trouble to "an increase in the pumpings from old coal mines, and a decrease in the amount of limestone water, its natural neutralizer." The pumpage from the Pennsylvania coal mines all contain more or less diluted sulphuric acid. The superintendent says:

Just above Reading two fine limestone streams used to empty into the Schuylkill. Last year the Reading people, in order to have a pure water supply, stopped one of these streams from flowing into the river and used it as a reservoir. Perhaps if this had not been done there would still be enough limestone in the river to neutralize the acid. But canal men report that the acid discharges have been increased by the emptying of an old mine belonging to Church & Co., which has not been pumped for twenty years. Now the fish, not being able to get the proper amount of oxygen through their gills, are suffocated and may be seen all along the river about Pottstown, I am told, coming to the surface and gasping in their efforts to get air. They breathe the sulphuric acid gas and are killed. Between here and Pottstown, however, there are a number of limestone streams which flow into the river and must have a neutralizing influence if the acid continues to come down. But a little sulphuric acid is not very dangerous. It exists in very minute quantities in most waters and is an important ingredient in most medicines. As human beings do not breathe through their gills they would not be affected in the same way as the fish.

I have no reason to believe that we will experience any difficulty here at Norristown, but even if we do, I think Philadelphia will escape, for from here to Conshohocken, a distance of three miles, the limestone strata again crosses the river and forms its bed and the water has to flow over it. I think it may be safely assumed that there will be nothing in the river coming down from above which will make the water you get at Philadelphia any worse than it is already."

Meantime the Philadelphia officials and medical men are considerably exercised, and an expert has already been sent up the river to make every exertion to obtain a satisfactory solution of the difficulty. A number of theories have been advanced, of course, and it is hoped that the impurities will be so dissipated and neutralized before reaching Philadelphia that no bad consequences will ensue. One result of the scare will be to draw attention anew to the steady and increasing pollution of Philadelphia drinking water by the discharge of foul substances along the Schuylkill, and there may possibly be enough influence brought to bear to diminish the evil for a time at least.

THE AMERICAN WATER-WORKS ASSOCIATION.

The report of the second annual meeting of the above Association, held at Columbus, O., March 14, 15, and 16 last, is just received. In a preliminary note, the Secretary, J. H. Decker, states that owing to the crude and almost useless state of the stenographer's copy of the minutes of the meeting, he has been obliged to rely very largely on his memory for his report, a circumstance to be deplored somewhat, as the proceedings of this and similar associations are beginning to embody so large and valuable a collection of facts and experiences of actual work that they ought to be given as complete as possible.

The report consists of an octavo pamphlet of sixty pages, and is illustrated with several large diagrams relating to the subjects treated, and which cannot be represented here. Among the subjects discussed, that on "Pressure Systems" was the first. It was given in the form of a report from Mr. T. J. Whitman, chairman of the committee on the subject, and was as follows:

PRESSURE SYSTEMS.

The word "pressure," applied to water-works, is usually intended to mean the pressure in the distribution pipes tending to burst them, and is usually expressed in pounds per square inch, or in feet in height of a column of still water whose weight on a square inch of base is the pressure in pounds avoirdupois per square inch.

The head of supply may be produced either by actually taking the water from a level higher than the distribution, or by forcing it into the distribution by pumps driven by external power.

At any given point in a system of distribution pipes, the pressure must either be constant or variable. The former only occurs either when no outlet is open, and there is a constant head of supply, or in the case of a steady flow where an equal quantity of water passes out of any outlet in equal times, and there is a constant head of supply. In this case the pressure is always less than when no outlets are open.

Practically, there are only two classes in which pressure can be considered. Those cases in which the head of supply is nearly constant, and those in which the head of supply may be varied at will, as the real pressure at any point is always varied by the flow at the neighboring outlets. We have, then, only to consider how the head of supply may be varied, and how the variation at any given point in the distribution system may be affected thereby.

Variations in the head of supply may be produced by the following methods:

By increase in speed of pumps used for supply until the increase of pressure is such that the pumps slacken speed again and continue to deliver the quantity into the distribution which flows from the openings thereof, and by actual change of the supply from one level to another.

VARIATIONS OF PRESSURE PRODUCED BY SPEED OF PUMPS.

At every stroke of a pump a change of pressure occurs in the force main near the pump, and to a less degree a change occurs in the entire distribution. To lessen the extent of such changes air chambers are placed on the pump discharge, and in some cases upon the distribution system, although their object is then to lessen the effects of changes in the flow of water in the distribution caused by changes of openings or of speed in the pumps. For the same purpose relief valves and stand pipes are placed on the force main to prevent sudden changes of pressure in the distribution. Elevated storage reservoirs act, of course, as equalizers of pressure, but serve also another purpose in storing water, and thereby contributing to the permanence of the supply.

When no relief is given to the distribution other than the air chambers of the pumps, large changes of pressure are continually occurring.

The choice of means to amend is to be governed entirely by the external conditions as to the cost of construction and operation, and whether it is desired to make large changes of pressure in the distribution or not. It may be regarded as a fixed fact, that low pressure in the distribution pipe tends to reduce waste, and that high pressure tends to increase it, and therefore this is an important item if high pressure for fires is required, and also at what elevations such pressure is required. The extent of the distribution is also a very important factor, and, of course, the size of the pipes.

In cases where the cost of construction and operation is nearly the same, the order of preference is considered by your committee to be the following, for constant head of supply:

Storage reservoirs of large capacity, of which the works at Baltimore are an excellent example.

Storage reservoirs of small capacity, of which Cleveland may be considered an illustration.

Storage stand pipes of large capacity, as at Sandusky.

Stand pipes of small capacity, of which, perhaps, Louisville may be taken as the best example, for although an extensive storage reservoir is used, yet the water is pumped to a constant elevation, and passes up one portion of the stand-pipe and down the other.

Air chambers in place of stand pipes, of which the committee have no personal knowledge. For widely varied pressures, the order of preference is as follows:

Storage reservoirs at different elevations, of which the works at Cincinnati would afford the best example.

Storage reservoirs for low pressure, and stand pipe for high pressure, as at Henderson, Ky.

Stand pipes of small capacity, of which there are many examples where variations of pressure can be made by the pumps, but very few where such changes can be rapidly made.

Air chambers, on the distribution of which your committee have no personal knowledge.

In the opinion of your committee, pumping directly into the mains without relief should only be resorted to when no other expedient can be resorted to without largely increased cost.

The annual cost of operating, other things being equal, will be nearly in the order given above.

As a method of examining the flow of water and pressure in the distribution pipes, the committee venture to add, as an appendix to their report, a valuable paper by Mr. M. L. Holman, C. E., member of the Association, which, although written and printed for another body, is yet considered as a desirable addition to their labors.

The title of this paper by Mr. Holman is, "Graphical Methods of Studying Efficiency of Water Distribution Systems and Performances of Fire-Engines, as illustrated by the Burning of the Collier Lead and Oil Works, St. Louis, Mo." The paper is illustrated by fine diagrams, and, as a contribution to the literature of hydraulics, is of considerable value as bringing together a number of valuable formulæ. The chief authority on the subject consulted was the little book by Geo. A. Ellis, entitled "Work Done by, and Power Required for Fire Streams, as determined by Experiments made in the Springfield Fire Department by Chief Engineer A. P. Leshure."*

A question arose in the discussion of the paper as to the accuracy of Ellis' tables, and Mr. W. C. Stripe stated that after careful examination he had found the tables absolutely correct, and considered the book worthy the consideration of every water-works manager.

The Committee on "Records" called from Mr. J. J. R. Croes the statement that he had been for some time engaged in collecting for publication in ENGINEERING NEWS just the information called for in the Report. He thought the collection made by himself would fully cover the ground, as he did not propose to stop until he had obtained statistics from every water-works in the Union. As the statistics, when completed, would be published in book form, the result of the discussion was the acceptance of the Report, and that the subject matter be referred to a committee consisting of Messrs. Croes and Wood, with the request that Mr. Croes embody the facts in his "History and Statistics of American Water-Works."

AIR CHAMBERS.

Mr. PLATT, of the Mohawk and Hudson Manufacturing Company, spoke at some length from his experience of the importance of air chambers in preventing the bursting of pipes.

Mr. G. A. PEARSONS, following, said the discussion shows that the use of air chambers on street mains is practically unknown to the members of the Association. At Kansas City, being very much annoyed by the use of elevators, and the air chambers at the pumps being small, he placed one on the main about midway between the works and the center of the city, choosing a location where it was hoped that the air from the mains would keep it supplied. Unfortunately this did not prove to be the case, and it soon filled with water. While in use, however (which is as much of the time as the business of the street superintendent will allow taking care of it), it has proved a very valuable adjunct to the system, taking away all pulsations from the mains and leaving the actions of the pumps almost as smooth and uniform as if pumping direct into a reservoir. In his opinion the real need of the direct pressure system is something of this kind which will act, so to speak, as a balance-wheel to the whole system, and the nearer it can be placed to the location of disturbance of pressure the more effective it will be. The inertia of water in long lines of pipe with its attendant water-ram is so great that such relief is not only a matter of convenience, but will prove on investigation worthy of being called a matter of necessity. In this connection he would state that he has patented a stand pipe designed for this purpose, and which is at the service of any member of the Association without royalty. The reason for excessive pressure on a pump-barrel far exceeding in some cases the effect produced on the accumulator, is, that the great weight of the plunger and its load may not be able to respond to the sudden shock of the plunger, by reason of the time of duration of the shock not being sufficient to overcome its inertia.

Air, when confined with water at high pressure, seemingly commencing at about 80 lbs. pressure and increasing with the pressure, is absorbed by the water, so the space is sooner or later filled entirely with water. The difficulty of keeping air chambers charged under high pressure is no doubt the cause of their being omitted with accumulators, which are in such cases intended to perform the work of both.

Mr. BRIGGS said very large air chambers were in use in his works, and he had never noticed any vibration of the needle except when some leak was discovered.

Mr. PETER MILNE, JR., of Brooklyn, on the sub-

* For sale at this office. Price $1.50.

ject of "Plumber's Work," responded in a very able manner, detailing the difficulties and losses to which water companies were subjected by reason of the faulty work of plumbers.

Mr. W. C. STRIPE, of Keokuk, presented a paper as follows on

WATER MOTORS.

My short experience of five years as a water-works man has taught me that we are subject to many impositions at the hands of our patrons. Some will make contracts for specific purposes and use the water for other purposes indiscriminately. Many waste water in a hundred ways—leaky pipes running at night to prevent freezing—carelessness in manipulating baths, water closets, and other appliances, etc., etc. But for cool, deliberate, unqualified imposition, commend me to the water motor. These are advertised to be economical and effective—running at a very small expense for water, in fact (if you take the *ipse dixit* of the dealer) anywhere if it be only a little *damp*.

I have before me an editorial clipped from a newspaper published in Iowa to this effect.

OUR NEW MOTOR.—About two months since we dispensed with our three-horse power engine, and commenced running our presses, consisting of a 30 × 52 Cottrell & Babcock, one-half and one-quarter medium Gordon's, by one of Tuerks No. 5 (8 inch) Hydraulic Motor, and so far have every reason to be satisfied with the change, the Motor working to our entire satisfaction. The expense for fuel and oil, to say nothing of the time required to attend to the engine, by the old process, averaged twenty dollars per month, while the water tax, at fifteen cents per thousand gallons, accurately metered, foots up seven dollars and eighty cents per month. We are satisfied these motors are cheaper, safer and more convenient than steam, and that they can be used to advantage (in towns and cities having water-works) in propelling machinery requiring five-horse power or less.

(Putting faith in the truth of this statement we were induced to contract for a supply of water for a precisely similar motor for the consideration of $150 per annum.)

Now, sir, I contend that that item was paid for by the motor man to advance the sale of his machine, as a proof of which that identical motor is now in operation at the same locality, and the same water company now charge $250 per annum for water to run it.

A motor on the piston and cylinder principle is comparatively honest, but a rotary one is the greatest waster of water in existence. If nature furnished the water at sufficient altitude from the motor, it alters the case; but if direct pressure is the principle of the water-works, or water has to be pumped to a reservoir to produce the head, then I assert that a rotary water motor is the most patent mode of expending much power to produce little effect in the whole range of mechanism.

Given that your motor is located 50 ft. above your pumps, you lose by so raising the water, and by friction 25 to 30 lbs. per inch, and greater loss still in proportion to altitute and distance.

Again, all rotary motors have much slip—the effective power secured being only by impact or percussion on the periphery of the wheel—pressure, per se, having but little to do with it. All things considered, I hold that from ⅓ to ¾ of the power taken from the water-works engine is lost, and not at all utilized by the motor. I have arrived at this conclusion by means of actual experiment and know that I am correct. If others doubt this, let them make the experiment and I will cheerfully acknowledge my error if such be found. At any rate the subject is of interest to all of us, and the truth is what we are in search of.

Mr. JOHN C. KELLEY, President of the National Water Meter Co., New York, then, on invitation, read a very able paper on "The Benefits of the Meter System as Shown by Practical Results," a copy of which can be had by addressing Mr. Kelley at 51 Chambers street, New York.

Mr. THOMAS J. BELL, Chairman of the Committee on Engine Duty, made a short report, which was accepted and placed on file; and at the same time addressed the convention on the subject of his Waste Water Meter Detector, which has proved very successful in Cincinnati, O. Mr. Ira A. Holly read a paper on "Rates and Revenues, Wastage and Meters." Mr. J. G. Briggs, of Terre Haute, read a paper on "Experiences in Buying Water-Works Machinery." The topics for the next meeting, which is to be held at Buffalo, N. Y., March 15, 16 and 17, 1883, will be found farther on.

A banquet at the Neil House followed the adjournment of the convention.

OFFICERS FOR 1882–3.

President.

Col. J. T. Foster, Chicago, Ill. (Union Stock Yards).

Vice-Presidents.

J. G. Briggs, Terre Haute, Ind.
W. C. Stripe, Keokuk, Ia.
J. J mes R. Croes, New York City, N. Y.
Thomas J. Bell, Cincinnati, O.
Edwin Darling, Pawtucket, R. I.

Secretary.

J. H. Decker, Hannibal, Mo.

Treasurer.

Horatio D. Wood, St. Louis, Mo.

Executive Committee.

Officers above, *ex-officio*.

The third annual meeting will be held at Buffalo, N. Y., March 15, 16 and 17, 1883.

TOPICS FOR DISCUSSION AT NEXT MEETING.

I. The consumption of smoke, or smoke burners of water-works boilers. Ira A. Holly, Burlington, Ia. II. The relative economy of constant and intermittent pumping. W. C. Stripe, Keokuk, Ia. III. The methods of filtration of water in use in the United States and Europe, with details of construction, cost and efficiency. J. James R. Croes, New York city. IV. The relative economy to towns of a supply of water under municipal control; and under control of private corporations. J. G. Briggs, Terre Haute, Ind. V. Plumbing work; its effect on the health of the family. Peter Milne, Jr., Brooklyn, N. Y. VI. The operation of hydraulic elevators; difficulties found in their service and remedies for the same; also, amount of water used by water motors supplied from mains. B. F. Jones, Kansas City, Mo. VII. Subsidence and filtration of western river waters, and availability of natural flow into filtering wells and galleries. G. W. Parsons, Kansas City, Mo VIII. The use of iron or steel tanks. J. Bell, Cincinnati, O. IX. Systematic compilation of annual reports. J. T. Foster, Chicago, Ill. X. Records of engine duties. Frank W. Holly, Lockport, N. Y. XI. How can the quantity of water passing through a water main, which is in operation, be ascertained. Geo. A. Ellis, Springfield, Mass. XII. How important a factor in the economic management of water-works is engine duty? Is its importance over-estimated or brought forward so as to cause less consideration of other important items of economy than should be given them. Prof. Chas. A. Smith, St. Louis, Mo. XIII. Repair and maintenance of machinery, valves, hydrants, etc., data and comparative cost of maintenance of different pumps, valves, hydrants, etc., with observations. Thos. J. Whitman, St. Louis, Mo.

The President stated that the Executive Committee had selected these from among the many topics presented for their consideration, and in making the assignments had done so to the best of their judgment. He hoped that each member to whom a topic had been named would fulfill his duty to the best of his ability.

LIST OF MEMBERS OF THE AMERICAN WATER-WORKS ASSOCIATION.

Active Members.

Axtell, S. P., Columbus, Ohio.
Baldwin, John R., Montgomery, Ala.
Ball, Phineas, Worcester, Mass.
Belcke, H. G., Peoria, Ill.
Bell, Thomas J., Cincinnati, Ohio.
Briggs, J. G., Terre Haute, Ind.
Brown, Calvin S., Toledo, Ohio.
Burnham, William H., Batavia, Ill.
Cameron, W. L., Memphis, Tenn.
Cannon, H. W., Stillwater, Minn.
Chuse, M. X., Bloomington, Ill.
Clark, H. A., Chicago, Ill.
Colburn, Robert J., Chicago, Ill.
Croes, J. James R, New York, N. Y.
Darling, Edwin, Pawtucket, R. I.
Decker, J. H., Hanibal, Mo.
De Luce, Wm. T., Chicago, Ill.
Doherty, Frank, Columbus, Ohio.
Donahue, M., Davenport, Iowa.
Dyer, Sydney M., Indianapolis, Ind.
Ellis, George A., Springfield, Mass.
Foster, J. T., Chicago, Ill.
Gray, Carroll E., St. Louis, Mo.
Harrison, H. H., Stillwater, Minn.
Hely, John P., St. Louis, Mo.
Holcomb, D. I., Sedalia, Mo.
Holly, Ira A., Burlington, Iowa.
Holly, Frank W., Lockport, N. Y.
Holman, M. L., St. Louis, Mo.
Holme, Richard, Jr., Denver, Colo.
Hoyt, Fred E., East Saginaw, Mich.
Jones, B. F., Kansas City, Mo.
Linneen, P. H., Lockport, N. Y.
Milne, Peter, Jr., Brooklyn, N. Y.
Molis, William, Muscatine, Iowa.
Moore, Arthur G., Cincinnati, Ohio.
Pearsons, G. W., Kansas City, Mo.
Quigley, J. B., Atchison, Kan.
Raeder, F. William, St. Louis, Mo.
Ratekin, William, Jacksonville, Ill.
Schon, Carl, Toledo, Ohio.
Sherman, William B., New Bedford, Mass.
Smith, Charles A., St. Louis, Mo.
Stanley, Orson G., Canon City, Col.
Stevens, G. C., Newport, R. I.
Stripe, W. C., Keokuk, Iowa.
Watts, Sylvester, St. Louis, Mo.
Whitman, Thomas J., St. Louis, Mo.
Wing, Fred, Kansas City, Mo.
Wood, Horatio D., St. Louis, Mo.

Honorary Members.

Bingham & Morgan, Buffalo, N. Y.
Blake, Geo. F. M'f'g Co., New York and Boston.
Chandler & Swift, Buffalo, N. Y.
Cincinnati and Newport Iron and Pipe Co., Newport, Ky.
Flower, James, Detroit, Mich.
Gaskill, H. F., Lockport, N. Y.
Goulds & Ostrander, St. Louis, Mo.
Jerecki, Hays & Co., Erie, Penn.
Long, Dennis & Co., Louisville, Ky.
Ludlow Valve M'f'g Co., Troy, N.Y.
McNiel, A. H., Burlington, N. J.
Michelon, James P., Gloucester City, N. J.
Mohawk and Hudson M'f'g Co. Waterford, N. Y.
Mott, J. L., Iron Works, New York, N. Y.
Mueller, H., Decatur, Ill.
National Meter Co., New York, N. Y.
Nelson, N. O. & Co., St. Louis, Mo.
Ohio Pipe Co., Columbus, Ohio.
Ripley & Kimball, St. Louis, Mo.
Roosevelt, C. H., New Rochelle, N. Y.
Shickle, Harrison & Howard Iron Co., St. Louis, Mo.
Union Water Meter Co., Worcester, Mass.
Wood, R. D. & Co., Philadelphia, Pa.

The Report, which should be read by every person interested in water-works, can be obtained from the Secretary, J. H. Decker, Hannibal, Mo. No price is named, of course, but it would be as well to enclose fifty cents, as it is worth it, and the expenses of the Association are very considerable.

PERSONAL.

A Paris despatch of the 11th states that "M. DELESSEPS leaves for Egypt to-morrow."

MR. W. J. WHARTON is chief engineer of the Washington and Western Railroad; headquarters at Alexandria, Va.

CAPT. JAMES B. QUINN, corps of engineers, has been assigned to duty at St. Louis, and First Lieut. WILLIAM H. BIXBY to report at Willet's Point, N. Y., for duty with the engineer battalion.

GENERAL QUINCY A. GILLMORE, having declined to serve on the commission to examine and report as to the safety of the New Capitol at Albany, Gov. Cornell has appointed Prof. WILLIAM P. TROWBRIDGE, of Columbia College, as the engineer member of the commission.

THE KING OF SIAM laid the foundation stone of a new temple a few weeks ago, making a brief speech on the occasion. One remark was especially expressive. "In laying it," said his Majesty," "I announce that its name shall be—'Pratommahorommarachanusawari.'"

Mr. ALEXANDER L. MASSEY, a well-known engineer of Philadelphia, died in London, England, June 30, aged 58 years. Mr. Massey was President of the Bell's Gap Railroad Company, the Penn Gas Coal Company, the Youghiogheny Coal Company and the Millwood Coal & Coke Company.

THE family of General ANDREW A. HUMPHREYS, U. S. A., formerly Chief of Engineers, intend to spend the summer at Rye Beach, New Hampshire, where General HUMPHREYS' son, Colonel HENRY H. HUMPHREYS, captain Fifteenth Infantry, will accompany them. General HUMPHREYS will leave later in the season.

ENGINEER CORPS, U. S. A.—The Senate has confirmed the following nominations:

Army.—Corps of Engineers—Lieut.-Cols. C. A. Stewart and C. E. Blunt, to be Colonels; Majors O. M. Poe and D. C. Houston, to be Lieutenant-Colonels; Additional Second Lieuts. O. T. Crosbie and L. H. Beach, to be Second Lieutenants.

COLONEL JOHN W. BARLOW, Major of Engineers, U. S. A., met with a narrow escape from death recently at New London by drowning. He, with an assistant, Captain ALBERT H. COMSTOCK, were in a small skiff going from the dock to the engineer department surveying vessel, Alice, which was moored in Shaw's Cove, when the frail

craft capsized, and the two occupants were rescued with much difficulty just in time to save life by a boat sent from a tug at the wharf.

A BOARD of officers, consisting of Cols. ZEALOUS B. TOWER and JOHN NEWTON, and Lieut. Col. HENRY L. ABBOTT, corps of engineers, has been ordered to meet at New York City to examine the following officers for promotion: Capts. WILLIAM LUDLOW, ANDREW M. DAMRELL, CHARLES J. ALLEN, and CHARLES W. RAYMOND, and Second Lieuts. HARRY F. HODGES and JAMES G. WARREN, corps of engineers.

MR. JOHN SCULLEN, President and principal owner of the Union Depot Street Railroad, St. Louis, Mo., has been appointed General Manager of the Mexican National or Palmer-Sullivan Narrow Gauge railroad, and will leave for the City of Mexico, where his head-quarters will be, in a few days. His salary will be $25,000 per year. Mr. SCULLEN went West from St. Lawrence County, New York, and is well known in the West as a superior railroad man. He was chief contractor of the Missouri, Kansas & Texas under ROBERT S. STEVENS, and has been connected with other roads in the West.

DR. R. W. RAYMOND, Mr. J. C. BAYLES and Mr. CHARLES MACDONALD, representing a joint committee of the American Society of Civil Engineers, the American Institute of Mining Engineers and the American Institute of Mechanical Engineers, have issued a circular, announcing that it is proposed to erect in the Central Park, New York, a monument to Alexander Holley. This monument, which is to consist of a suitable pedestal in stone, with architectural and symbolic decoration, surmounted by a portrait-bust in bronze, will, it is estimated, cost about $10,000. Mr. Charles Macdonald, Treasurer, of 52 Wall street, will receive subscriptions, which will be periodically acknowledged.

COLONEL THEODORE B. SAMO, the well-known civil engineer, died a few nights ago at his residence, Georgetown, a suburb of Washington, D. C., after a long and painful illness. Colonel Samo was for many years employed on the Washington aqueduct, in charge until 1869, and afterward, until his death, as assistant to General Babcock and Colonel Casey, corps of engineers, the control of the aqueduct having been transferred by law to the Chief of Engineers. He was a gallant officer during the late war, and after his assignment to the charge of the aqueduct took a deep interest in the welfare of the District. He had been ill for a long time, and was brought to his home in Georgetown only last week from a trip which it was hoped would benefit him, but which failed to afford any relief. He was a man greatly respected in the community, and his loss will be deeply regretted.—*National Republican, Washington.*

THE CITY OF ALEXANDRIA.

DESCRIPTION OF THE PLACE—ITS EVENTFUL HISTORY.

The city of Alexandria was founded by Alexander the Great in 332 B. C. It was beautifully and regularly laid out and in the height of its prosperity comprehended a circumference of fifteen miles and contained 300,000 free inhabitants and as many slaves. The city lies low, and the approach from the Mediterranean is the reverse from picturesque. But few remains of the ancient city, which stood on the western mainland shore, opposite the island of Pharos, since converted into a peninsula, are now extant; its extent from east to west seems to have been four miles, traversed by two grand streets, each 100 feet wide. The Catacombs, the public cisterns and the column erected in honor of Diocletian, which is called Pompey's Pillar, with some portions of the Roman city wall, still remain to attest the traditions of classical antiquity. Alexandria owed its wealth and prosperity to the conformation of the sea-shore, with the shelter afforded by the small Pharos islet, providing a commodious harbor, called by the Greeks Eunostos, with good anchorage in deep water, on the western side. The eastern harbor, though it is called the New Harbor, has been little used, being exposed to the north winds, much clogged with sand and having a foul and rocky bottom. These two harbors are separated from each other by a broad causeway, or artificial isthmus, now joining Pharos to the mainland of Egypt. This tract of land, however, on the main, is of no great worth, lying between Lake Mareotis, to the west, and the Bay of Aboukir, eastward; while the Canopic mouth of the Nile is to the east fourteen miles distant. There is a connection with the Nile by the Mahmoudieh Canal, which extends from Alexandria to Fouah, a distance of forty-eight miles. The distance to Cairo is about one hundred and thirty miles by railway, but it is a journey of five hours. The ancient Pharos lighthouse is at one extremity of the island and the modern lighthouse at the other. The Khedive's palace of Ras-el-Tin is situated on the island, next the modern light-house and fort. The Arsenal is at the inner harbor; the Catacombs, on the southern shore, marking the site of the ancient city. The interior of the town itself presents no features of interest. There are the quays, with old-fashioned, rather squalid houses on the shore of the Old Port; the Arab quarter, to the south, consisting of mud hovels; the cotton market, the canal warves, the railway station and baracks, on the same side; to the east, facing the New Port, beyond Fort Napoleon, is the Grand Square, the Place des Consuls, or Frank Square, formerly called the Place Mahomet Ali, which has, with several adjacent streets, come to be chiefly inhabited by European residents. It was in the Rue des Sœurs "Sikket el Binaat," in this quarter of the city, that the frightful riots of Sunday, June 11, began, and simultaneously in two other places, and along the Marina. These parts of Alexandria seem to have been quite out of sight, as well as out of reach, of the British naval squadron lying in the harbor or in the outer roadstead.

The people of Alexandria, a various mixture of nations, united the vanity and the inconsistency of the Greeks with the superstition and obstinacy of the Egyptians.

Half the population of the city were swept away by the plague A. D. 250.

Caracalla ordered a general massacre of the citizens of Alexandria after he became Emperor.

During the reign of Constantine the struggles between the orthodox and Asian bishops deluged the capital of Egypt in blood.

During the reign of Valentinian and Valens 50,000 Alexandrians were drowned by an immense tidal wave.

The city was taken by the Saracens under Amron after a siege of fourteen months and a loss of 23,000 men and the famous library was destroyed. The volumes of this unequalled collection were distributed to the 4,000 baths of the city, and such was their incredible multitude that six months was barely sufficient for the consumption of the precious fuel. At this time Alexandria contained 4,000 palaces, 4,000 baths, 400 theatres, 12,000 shops for the sale of vegetable food and 40,000 tributary Jews.

THE SUEZ CANAL.

The great water-way between the Mediterranean and the Red Sea, owing to the war in Egypt, has of late again been brought prominently before the public. A short sketch of its history will, therefore, not be without interest at the present moment.

In almost prehistoric times the Eastern branch of the Nile and the Red Sea were united by a canal, made under Necho and Ptolemy Philadelphus. Traces of it are still visible, but it is not known when it ceased to be a navigable communication.

In modern times Napoleon I., during his sojourn in Egypt, conceived the idea to reopen the canal between Cairo and Suez, and instructed the engineer, Lepere, to study the question. Lepere found a difference of 30 feet in the level of the two seas, and although his measurements turned out wrong afterward, the plan was abandoned.

In 1840, M. Linant de Bellefonds; in 1846, Enfantin; in 1847, M. Talabot and M. Barrault again proposed piercing the Isthmus, but could not find any one to listen to their projects.

It was in December, 1854, when M. de Lesseps first explored the desert along the Isthmus, and found the establishment of a canal feasible. To his indomitable energy it is due that the works were commenced in 1860, and the new water-way opened for traffic nine years later. During this time the harbor of Port Said, on the Mediterranean end, was constructed between two jetties of two and three thousand yards in length respectively. At Suez, the Red Sea was sufficiently protected from adverse winds to dispense with jetties and to inclose the canal between two quays.

The tract of low-lying land connecting Africa with Asia extends about 74 miles from north to south and is composed of shell limestone rocks mixed with strata of silicious limestone, and partly covered with sand or salt marshes. The deepest cuttings had to be made near El-Guisre, near Serapeum and Chalouf. Equi-distant from Port Said and Suez a new town, Ismailia, was built on the shores of Lake Timsah, to protect the outlet of a second canal, which carries the fresh water supply from the Nile, near Cairo to the Isthmus, distributing the same in two branches to Suez and Port Said.

The supply of fresh water was of the utmost importance when more than 20,000 laborers were employed in the construction of the canal, and is still a necessary of life for the towns of Port Said, Ismailia and Suez, as well as for the engineering staff which keeps the canal in repair and for the convenience of the shipping, considering that a supply of drinking water from wells can be obtained at one or two places only.

England, who at first opposed the construction of the canal, has since become fully alive to its political and commercial value as the shortest route to India, the distance between Bombay and London having been reduced—compared with the route round the Cape—by about 7,000 miles. The number of vessels, the greatest part English, rose from 1,477 in 1879 to 2,727 in 1881. It is, therefore, a matter of grave anxiety whether the safety of the passage can be depended upon in a crisis like the present one.

"DE LESSEP'S DITCH."

The Suez canal is one of the greatest arteries of commerce that is apt to be more or less forgotten till brought to notice by some special circumstance, which in the present case is the prospect of trouble between England and Egypt. The work on the canal began under a charter for ninety-nine years, granted by the Viceroy of Egypt, November 30th, 1854, in 1859, and on the 15th of August, 1869, the waters of the Red Sea and the Mediterranean were mingled in the Bitter Lakes. The formal opening of the canal took place on the 17th of November, 1869. The canal proper is a broad and deep salt-water channel without locks, extending from Port Said to Suez, a distance of about 100 miles, one-quarter of the route lying in the "lakes" of the isthmus, in many of which excavations were necessary. The width of the canal, except in deep cuttings, is 325 feet at the surface, and 72 feet at the bottom, the depth of water being 26 feet. When it runs through high ground, as to the north of Lake Timsah, the width at the surface is 195 feet, with slopes of 2 to 1. The "fresh water canal," to which allusion is frequently made in the cable despatches, and which was designed for purposes of transportation and to supply water to the workmen along the line, begins at Zagazig, and carries the water of the Nile to Suez. It is navigable through its whole extent, changes of level being overcome by locks. At the Port Said terminus is a basin half a mile square; at Suez is a similar basin protected by a breakwater, the depth of water in each harbor being 26 feet.

From the following table, copied from the New York *Herald*, showing the growth of the traffic of the canal, it appears that in 1881 nearly half the steam vessels and much more than two-thirds of the steam tonnage of the world passed through this great artery:

Year.	Vessels	Tonnage.	Receipts
1870	486	435,911	$1,031,865
1871	765	761,467	1,798,746
1872	1,082	1,439,109	3,281,518
1873	1,173	2,085,072	4,579,464
1874	1,264	2,423,672	4,971,877
1875	1,494	2,940,708	5,777,260
1876	1,457	3,072,107	5,995,000
1877	1,663	3,418,949	6,334,860
1878	1,593	3,291,535	6,219,646
1879	1,477	3,230,942	5,937,212
1880	2,026	4,344,519	7,908,000
1881	2,727	5,704,900	10,254,800

Of course England makes the greatest use of the Suez Canal, but it is hardly realized, even in England, how important "De Lesseps Ditch" is to her commerce. In 1870 she furnished 64 per cent. of the tonnage which sought that channel; in 1871, 65; in 1872, 70; in 1873, 69; in 1874 and 1875, 71; in 1876, 73; in 1877, 78; in 1878, 79; in 1879, 77; in 1880, 79, and last year, 82 per cent.

On Nov. 25, 1875, public announcement was made that Lord Beaconsfield had purchased from the Khedive of Egypt, through the intermediary of the Rothschilds, for the sum of £4,080,000, 176,602 out of 400,000 shares of £20 each, on which investment 5 per cent. interest was to be paid till July 1, 1894, when the shares were to receive interest. England receives no share of the earnings of the canal until 1894, but she receives her 5 per cent. upon her shares. There are three gentlemen who represent the British Government on the board, Col. Stokes, Mr. Rivers-Wilson and Mr. Stanley. The two former gentlemen attend every meeting of the board, and the latter is a resident director in Paris, and sends the Government information of everything that occurs there. England's total investment in the canal shares was a trifle under the £4,080,000 voted for the purpose, the Rothschilds' commission and other expenses coming to just about £100,000. Of the 5 per cent. on the purchase money which goes into the English treasury, 1½ per cent. is applied to the payment of the debt raised to purhase the shares. But England's interest is not to be measured by a money standard alone.

GRANITE BLOCKS.

Granite, having little grain, can be cut in blocks of almost any size and shape. Specimens as much as eighty feet long have been taken out, and transported great distances. The quarrying is done by drilling a series of small holes, six inches or more deep, and about the same distance apart, inserting steel wedges along the whole line, and then tapping each gently with a hammer in succession, in order that the strain may be evenly distributed.

GENERAL INTELLIGENCE.

☞ *We solicit and are always pleased to publish in these columns any items of interest that may be furnished us.*

GAS AND WATER.

THE PARK WATER COMPANY.—A certificate of incorporation of the Park Water Company, of New York, was filed in the County Clerk's office, on the 12th. This corporation is formed to supply water for mining, domestic, manufacturing, and agricultural purposes, and particularly to supply the city of Sacramento and other cities and towns of California. Its capital stock is fixed at $2,500,000, divided into 2,500 shares of $100 each. Its incorporators are Cole Saunders, Myron W. Bradley, and Charles N. Morgan, who, with Alexander T. Beach, Gustave S. New, William Nowlan, and John M. Coughlin, will form its Board of Trustees for the current year.

The city council of Decatur, Ill., closed a contract on the 8th with a Hudson, N. Y., company to supply the Decatur water-works with a new pump; capacity, 3,000,000 gallons daily, for $8,700, the same to be in operation within one hundred days.

The proposed introduction of additional water meters in Boston, and of the Deacon waste-water meter, was defeated in council by a vote of 37 to 25.

The city of Davenport pays $564 per year for lighting the government bridge at night—the expense aggregating nearly $6,000 since the completion of the bridge.

The condition of the city's drinking water has improved somewhat of late, owing to cool weather and the copious rains that have kept the basins full, but it continues to excite some apprehension in the minds of consumers who are informed on hygienic subjects, and who, consequently, pass their lives under a cloud of fear that they may at any time swallow something which will cause sudden dissolution. It is evident that circumspection is necessary in the use of Cochituate, although one should be slow to commend the excessive caution shown by a substantial citizen who was seen to partake of a draught furnished by one of the public drinking fountains the other day. Immediately upon drawing the water he smelled of it cautiously, then examined it critically with a large magnifying glass which he took from his pocket, and finally, furtively extracting a flat black-glass bottle from the tail of his coat, he turned into the cup about a gill of reddish-brown liquid, evidently having an alcoholic base—perhaps it was some sort of cholera mixture—and swallowed the draught with an expression of countenance which seemed to indicate that he found it not altogether disagreeable. He then—actuated, no doubt, by the fear that the dregs of the potion might not agree with the next drinker's peculiar constitution—rinsed out the cup very thoroughly and went his way. Now we cannot all lug around microscopes, but almost everybody has a coat-tail pocket big enough to hold a phial of anti-febrile or anti-malarial specific.—*Boston Journal.*

LITIGATION ABOUT GAS.—Logan, O., July 11.—Last summer the Logan Council contracted with McDonough & Co., of Cincinnati, who built the Logan Gas-works, to light the city at so much per post for the term of ten years. When the new Council went into office, in April, they refused to pay the gas bills for April and May, claiming the contract was illegal, on the ground that it had not been left to the voters of the city. The Gas Company took it to Court. The case was tried before Judge Friesner at the June term of Court, and he renders his decision in favor of the Gas Company. The Council will carry it to the District Court.

WILL BUILD WATER-WORKS.—The Common Council of Orange, N. J., on June 30, passed an ordinance creating a "Water Committee" to erect and maintain water-works for the city, and authorizing an expenditure of $400,000

MEDINA, O., finds an inexhaustible supply of water at a depth of 160 feet.

FILTERS.—From the *Republican* of Springfield, Mass., we clip the following communication:

To the Editor of the Republican:

A short time ago my attention was drawn to the sand filters used at the Southworth Paper Mill at Mittenague and the excellent water obtained by them. These filters are two big boxes 100 by 12 ft. and 3 ft. deep; the bottom is common board in two layers, laid crossways, covered with coarse gravel, and finally common sand, so abundant everywhere around here. Only one sand-bed is used, the other being kept as a reserve; the one used filters a stream of water 6 in. square, flowing with a speed of about 4 ft. a second, or about 1 cu. ft. a second, and about 500 gallons a minute. The water flows over the top surface from a common wooden channel, and filters so rapidly that it is visible only half the length of the sand-bed. The Water Commissioners, too, are experimenting in the line of filtering through sand, but their galleries, while no doubt excellent, seem more expensive than these sand-beds. Supposing there was in the city of Springfield a consumption of 100 gallons of water per head, and per day (a very high estimate), we would have a consumption of 3,500,000 gallons a day, or 350 cub. ft. per minute. To filter this amount a bed of sand of 7,200 sq. ft. would be required, supposing that the rate was the same as at Mittineague; this would practically require the following construction: A ditch about 9 ft. deep, 900 ft. long and 24 ft. wide at the outlet, filled half way with coarse stones, the bottom of boards loosely laid, and afterwards gravel and about 3 ft. sand; the top of the sand would be left free and from a wooden channel, the water of the pond being distributed all over the sand surface, would filter through the sand and flow through the lower part of the ditch, which gives ample space, into the pipes. The cost of such a ditch, etc., could not be very heavy; probably $2,000 would cover all. At Mittineague the filters are used all the year round, the surface being renewed now and then by skimming it with a shovel. The sand is changed once a year. In the meanwhile the water filters through the other sand-bed. This principle, by the way, is used in the densely-populated parts of Europe, where the water of rivers has to be used for drinking purposes, as far as water is drunk. Hamburg and Berlin have systems of filtering which are a combination of the galleries proposed by the water commissioners and the sand-beds used at the paper-mill. C. M.

SPRINGFIELD, Mass., July 11.

STREETS, DRAINAGE, ETC.

DRAINING BLACK ROCK TUNNEL.—The Philadelphia & Reading Railroad have had a survey made for the building of a viaduct at Phœnixville to carry the water that falls at the southern end of Black Rock tunnel over the railroad into a drain leading under the canal into the Schuylkill River.

NEW SEWER WANTED.—The city engineer of Toronto has recommended, on sanitary grounds, the building of a sewer on Church street from Gerrard southward.

THE NATIONAL ASSOCIATION FOR SANITARY AND RURAL IMPROVEMENT has just had an annual gathering at Greenwood Lake, New York. The name of the organization and some of the papers read sufficiently indicate its object. Considerable time was given to the discussion of tree planting as a factor in rural improvement and to the wholesale destruction of forests in the West—a destruction so wanton that the best-informed dealers fear that in 10 or 12 years there will be no more lumber to be obtained in the great lumber states—Michigan, Wisconsin and Iowa. Ex-Gov. Frank Fuller, of Utah, read an interesting paper showing the evils of the modern system of cooking, which sacrifices the good of the body to taste. In its course he declared that "from the annual strawberry period the most serious forms of intestinal lesion date, owing to the sharp insinuating, burrowing seed of the berry. These injure the alimentary canal, cause cul de sac cavities, leading almost necessarily to fistulous openings oftener than all other causes combined." He prophesied that the time would eventually come when only the juice and pulp of these small, seedy fruits would be eaten. In the course of a talk on "Tenement-house Reform," George C. Barth of New York city stated that there are 20,000 tenement-houses in that city which accommodate from four to forty families each, and 8,000 that accommodated from two to four families apiece. And he declared that "the wealthiest church corporation in the city owned scores of the worst and foulest, and would pay no attention to their sanitary condition, nor heed the instructions that is preached to them by liberally paid pastors, but squeezed from the poor every cent possible, evicting tenants who for any reason get behind in their rentals, and who last May increased the rentals from ten to fifteen per cent." The association adopted a resolution applauding the work done by the national board of health and decrying the proposed congressional limitation of its means and functions. Erastus Brooks of New Brighton, S. I., has been made president of the association. At the conclusion of the discussion on the papers presented, a permanent organization was affected under the title of the "National Association for Sanitary and Rural Improvement." The following are the officers elected: President, Hon. Erastus Brooks, New Brighton, S. I; Vice-Presidents, Henry E. Pellew, New York; Frederick Law Olmsted, Brookline, Mass; Col. Geo. E. Waring, Jr., Newport, R. I.; Prof. Henry Morton, Stevens' Institute, Hoboken, N. J.; Isabella Beecher Hooker, Hartford, Conn.; Secretary, Charles F. Wingate, Brooklyn; Treasurer, Harvey E. Fisk, West Ewing, N. J. Executive Committee, Hon. Frank Fuller, N. Y.; Jas. C. Bayles, Orange, N. J.; Dr. R. H. Storer, Newport, R. I.; Mrs. H. M. Plunkett, Pittsfield, Mass.; Rudolph Hering, Philadelphia, Pa.; Dr. D. F. Lincoln, Geneva, N. Y.; Prof. J. Madison Watson, Elizabeth, N. J.; Prof. Albert Leeds, Stevens' Institute, Hoboken, N. J.; Mary Putnam Jacobi, New York; Louisa Lee Schuyler, New York; Mrs. Josephine Shaw Lowell, New York; Dr. Alfred L. Carroll, New Brighton; Maurice Fornachon, Paterson, N. J.; Dr. J. H. Pinkham, Montclair; Dr. C. F. Folsom, Mass.; Wm. O. McDowell, Warwick Woodlands; Dr. A. N. Bell, New York; Edward Dunn, Newark, N. J.; Dr. J. H. Kidder, Washington, D. C.; William Blaikie, Englewood, N. J.; M. C. Heath, M. E., New York; E. P. Roe, Cornwall-on-Hudson, N. Y.; Dr. Pinkham, Lynn, Mass.

PROPOSALS FOR PAVING.—The City of Holyoke, Mass., will receive proposals for paving up to July 17.

RIVERS AND HARBORS.

MEETING OF HYDROGRAPHERS.—An effort is being made by the hydrographic officers of several nations to have called an international convention of Hydrographers, to consider a number of subjects of interest to navigation with a view to making the system of charting and references uniform among all the maritime nations. Among the points to be considered is the method of describing magnetic bearings, some nations giving the bearings from the lights or headland, while others are from shipboard. Another is the necessity of adopting a uniform method of charting, and of indicating depths of water, and all nations recognize the necessity of the adoption of a prime meridian. The latest nation to issue hydrographic charts is the Japanese, whose work is of the highest character.

In 1878 Congress appropriated $300,000 for the improvement of the Harlem River, with a view of making a wide and deep channel from the East River to the Hudson, and in 1879 the sum of $100,000 was added, all conditioned upon the gaining of a right of way without expense to the United States. Memorials were presented in the House this week by Messrs. Dunnell, of Minnesota; Converse, of Ohio; Duester, of Wisconsin; Hiscock, of New York, and Cox, of New York, urging that some use be made of this money in constructing the proposed improvement. The memorial was signed by many prominent business men of New York and elsewhere. Mr. Charles Stoughton offers to make a channel 225 feet wide and 15 feet deep on the proposed lines for $1,375,000.

TUNNELS.

THE NORTH RIVER TUNNEL.—During the last week 25 feet of completed work has been done in the North River Tunnel at the Jersey side. The total distance now completed on that side is 1,197 feet in the north tunnel and 562 feet in the south tunnel. The heading of the north tunnel having been advanced 475 feet from the inner air-lock, a new air-lock is now being set up 20 feet from the heading. An auxiliary air-lock for passing timber is being put in the same bulkhead. In the north tunnel, on the eastern side of the river, the plates of the new section, which is 15 feet long, have been carried down about two-thirds of the circle. The earth has improved sensibly, and less difficulty has been met than heretofore. The steam power on this side has been found inadequate to supply the air-compressors, and a large boiler is being set up to supplement those already in use.

RAILROADS.

AN EXPENSIVE ENTERPRISE.—A Boston exchange says: "The Leavenworth, Topeka and Southwestern Railroad Company, of Kansas, which recently made a mortgage to the American Loan and Trust Company, of this city, for $1,500,000, has found that railroad-building is expensive. To build fifty-eight miles of road between Leavenworth and Topeka, the promoters organized a construction company with $500,000 capital, and $465,000 in cash was paid in. This has been expended, and now the construction-company subscribers have got to put in another $500,000 to get their road into the capital of Kansas, for the road will cost nearly $20,000 per mile. At a fair price for the bonds now being issued at the rate of $25,000 per mile, the construction company may get a new dollar for an old one.

THE engineering staff of the Kingston & Pembroke Railway Co. has been camped near the village of Renfrew, Ont., for the last few weeks, and are engaged in looking out a site for their railway, between that place and Calabogie, a distance of about thirteen miles. They have explored several routes, but have not as yet, so far as can be learned, located the line.

CHANGE OF ROUTE.—It is proposed to build a line of rails from the Bangor & Portland road, beginning at a point four miles from Martin's Creek, run down the west bank of the Delaware through Easton and connect with the Lehigh & Susquehanna road between Easton and Bethlehem, Pa. This would make through connection from Philadelphia to the Delaware Water Gap, and the distance would be 28 miles less than by way of the Belvidere Delaware road. The Reading system would embrace this road.

AMONG the charters which have just been granted by the State Department was one to the Tionesta & Clarion Railroad company, which proposes to build a road from Eagle Rock to Fairmount, Clarion County, a distance of 50 miles. Its proposed course is through portions of Clarion, Venango and Forest counties. The capital stock is $1,000,000. The principal officers are to be in Philadelphia. The directors are: John W. Jones, President; George F. Tyler, E. A. Rollins, B. K. Jamison, C. H. Clark, H. M. Sill and Joseph R. Trimble, of Philadelphia; Archer N. Martin, Summit, N. J.; H. A. V. Post and Charles Pomeroy, New York.

A charter has also been granted to the Bradford & Tiona Railroad Company, which proposes to build a narrow gauge railroad, 12 miles in length, to connect with the Garfield & Cherry Grove Railroad. Alonzo J. Wilcox, of Bradford, is President. A charter has also been granted to another company, which has in view a railroad from Garfield, Warren County, to Tionesta, Forest County, a distance of 28 miles. Asabel N. Cole, of Wellsville, N. Y., is President of the road.

CANADIAN PACIFIC.—General Manager Van Horne, Chief Engineer James and Superintendent Egan returned on the 9th from a trip to the end of the Canadian Pacific Railway west. They report over 4,000 men and 2,000 teams at work on the construction of the main line west. Rails have been laid to a point 116 miles west of Brandon, to which point a telegraph line has been also constructed. The grading is completed some 80 miles further west, which carries the graders out of the wet lands that have hindered construction for some weeks. The present terminus of the track-laying will be made the end of the second division.

THE MONTREAL, OTTAWA & WESTERN RAILWAY COMPANY, which was the original company to get a charter for the present Quebec, Montreal, Ottawa & Occidental Railway, and built the road from Montreal to Aylmer in 1875, to-day commenced the work of continuing the road from St. Jerome to St. Agathe, thence following the valley of the Red River, to tap the Gatineau Railway at Desert, 100 miles from Ottawa, thence in the direction of Lake Temiscamingue, to join the Canadian Pacific Railway. The total length will be about 200 miles.

THE KANKAKEE VALLEY RAILROAD COMPANY was organized at Laporte, Ind., on the 5th ult., with a capital of $1,600,000. The plan is to dredge and straighten the Kanakee River from South Bend, Ind., to Momence, Ill., draining a large area of overflowed lands, and use the dirt obtained by dredging to grade the road. The Directors are Clem Studebaker, J. M. Studebaker, Judge Stanfield and A. S. Baker, of South Bend; General Gleason, W. B. Biddle, E. H. Scott and

M. Ney, of Laporte; W. E. Pinney, of Valparaiso; Thos. J. Wood, of Crown Point; General George W. Cass, W. F. Singleton and E. Lamphere, of Chicago. The incorporators are all leading business men.

STREET RAILWAY.—Books of subscription to a street railroad will be opened soon in Birmingham, Ala.

R. R. EXTENSION IN VIRGINIA.—A corps of engineers has been organized for the extension of the Washington and Western railroad (late Washington and Ohio) from its present terminus to Winchester, and will begin work Monday.

THE TORONTO AND OTTAWA.—Work on the Toronto and Ottawa Railway has been begun on the farm of John Woods, near the village of Arden. The operations are conducted east and west. The whole line has been located and grading is now being done. Between sixty and seventy navvies are engaged at this work, under the supervision of Mr. Quinlan, of the firm of Quinlan & Stewart, St. Ann's, who have a contract on ten miles from Sharbot Lake.

THE ATLANTIC & PACIFIC.—Work on the Atlantic & Pacific Railroad at Mohave is moving forward slowly. The track has been laid east 21 miles, and graders and surveyors were out 20 miles further at last accounts.

A SOUTHERN PROJECT.—The *Gainesville Southron* says enthusiastically: "We are glad to be able to say positively that the Gainesville & Dalton Railroad will be speedily built. The parties having the enterprise in hand have made arrangements for all the capital required, and now nothing remains to be done except to go to work and build the road."

The Connotton Valley Railway is now in operation from Cleveland, O., to Sherrodsville and Minerva (106 miles) and in process of construction from Canton to the Hocking Valley (120 miles). The capital of the company is $5,000,000, and the authorized issue of bonds, $7,000,000. The receipts of the road on July 4th were $9,000, and the gross earnings are increasing steadily at the rate of about 15 to 20 per cent. per month. The headquarters of the the company is 18 Exchange St., Boston, Mass. The President is Francis Bartlett, Esq., and the Treasurer is Wm. Rotch, Mem. A. S. C. E., recently of the Mexican Central Railway.

CANADA-ATLANTIC RAILROAD.—*The Boston Journal's* Vermont correspondent, writing from Alburgh Springs, says: The work of construction on the Canada-Atlantic Railway is rapidly progressing, and that portion of the line between Coteau Landing and Ottawa, a distance of 82 miles, will be completed before Aug. 1. The Track layers are within a few miles of the Dominion Capitol. The route of the line from Valleyfield on this side of the St. Lawrence, opposite Coteau Landing, has finally been decided upon and the locating survey completed. The road will cross the Richelieu or Sorel River, in the township of Lacolle, a portion of Ash Island being utilized for bridging purposes. The plans and specifications for the new bridge are made, and work on the structure is in progress. Ground has been broken for the approaches. The Canada-Atlantic will enter Vermont in the town of Alburgh, where connection will be made at Alburgh Springs with the Central Vermont Railroad system. Several hundred thousand ties for this section of the road have been contracted for, to be delivered at Lacolle, and 5,000 tons of English steel rails have been purchased for this portion of the Canada-Atlantic. From this time forth the work will be vigorously prosecuted, and it is expected that the present year will witness the opening of the entire line between Alburgh Springs and Ottawa for business. The great advantages to the commercial interests of Boston that will inevitably accrue on the opening of this new short line to the Ottawa lumber region and the vast grain fields of the Northwest cannot be overestimated.

THE CANADA PACIFIC.—Canadian advices state that the Canada Pacific Railroad has purchased the rights of the Southeastern Company, which has a charter for a railway from opposite Montreal to the Provincial line. The object is to prevent American companies from making connections from Montreal to Chicago on the American side. The Great Eastern, however, has a charter also for a road from Montreal to the Provincial line, but there is no immediate prospect of the work going on unless it is undertaken by American railway men, in which case the road will be continued to opposite Quebec and join the Intercolonial with Halifax as its terminus. The Canada Pacific will not build a bridge over the St. Lawrence River, but construct a tunnel at the lower end of the city. The determination of the Pacific to compete with the Grand Trunk and American system is evident in this.

TWO LOCOMOTIVES DAILY.—The Louisville & Nashville Railroad is receiving two new locomotives a day from Eastern works.

A NEW INDIANA ROAD.—The Kansas Valley Railroad Company has been organized at Laporte, Ind., to build a road from South Bend to Momence. The capital stock is $1,600,000, and the Studebakers are enlisted in the enterprise. It is proposed to dredge and straight en the river, and use the dirt to grade the road-bed.

WORK SUSPENDED.—Work on the Georgia Pacific Railroad, from Columbus eastward, has been suspended.

A COSTLY RAILWAY STATION.—It is rumored in Montreal that the Canadian Pacific Railway Company is in treaty with the city for the site occupied by the Bonsecours Market, and with private parties for the site of the Bonsecours Catholic Church, the oldest church in the city, and a commercial block, thus giving them access to Jacques Cartier square, on which they will erect a station to cost $1,000,000. Jacques Cartier square is quite central, and the scheme, though a gigantic one for Montreal, is quite feasible and will be very popular.

SOUTH PENNSYLVANIA R. R.—The surveyors are making good progress on the two new lines of railroad to be laid out in that portion of the State lying between the Susquehanna and Ohio Rivers. One of these lines, the South Pennsylvania, will start from Marysville, a few miles from Harrisburg, and will run from that point across the Allegheny Mountains, through Somerset county, thence to Connellsville and Uniontown across the Monongahela, and by way of Waynesburg to Wheeling. The other road, the Pittsburg & Atlantic, proposes to commence at Chambersburg and pursue the same general route as the other company until after the Allegheny Mountains are crossed, after which they descend the Youghiogheny River to Connellsville, where the line will end. At that place it will make a connection with the Pittsburgh, McKeesport & Youghiogheny R. R., now in course of construction.

[This proposed line, which recently had 30 corps of engineers at work, now has only two; the contracts which were to have been let some time ago, "hang fire." In 30 miles there are 6 miles of tunnels located. Oliver W. Barnes is Chief Engineer, and New York City is headquarters.]

VIRGINIA RAILROADS.—The Virginia legislature during its session of 1881 and extra session of 1882 passed acts as follows regarding new railway enterprises. We clip the summary from *The Virginias:*

Virginia Coal and Iron Co., incorporated, with power to buy and sell real estate, mine coal, iron ore, etc., to construct and operate a railway or railways from any point on Norfolk & Western or Bristol Coal and Iron N. G. R.'s in and through Lee, Wise, Buchanan, Dickenson, Scott, Russell, Tazewell and Washington counties; to erect and operate furnaces, mills, etc. Its annual meetings are to be held at Alexandria, Va.

Saltville & Coal Mine R. Co., charter amended and name changed to Norfolk & Cincinnati R. Co.; authority granted to construct and operate lines of railway from any point on Norfolk & Western R. between Emory and Wytheville through Washington, Smyth and Wythe counties to any point or points on Ky. or N. C. lines, or to any road leading to tidewater, and by such routes as it may deem most advantageous for developing the resources of the country traversed. It and the Bristol Coal & Iron N. G. are prohibited from occupying exclusively any mountain pass.

Henrico R. Co., incorporated to construct and operate a railroad from Hungary station of R., F. & P. R. through Henrico and Goochland counties to James River in those counties, with power to extend same from Hungary to any point on C. & O. R. in Henrico or Hanover.

Richmond & Southwestern R. Co. consolidated with Kentucky & Ohio Narrow-gauge R. Co., joining their rights and privileges, and changing name to Richmond & Louisville R. Co., and authorizing new company to extend its road from, at or near New River depot to, at or near Portsmouth, and to build a branch up New River to N. C. or Tenn. lines.

Bristol Coal & Iron Narraw-gauge R. Co. changed to South Atlantic & Ohio R. Co., and authority granted to extend line or build branches to any point or points on Ky. line in Lee, Wise, Dickenson or Buchanan.

Iron Belt R. Co. incorporated with authority to construct and operate a railway from James River at or above Buchanan, by the most practical and suitable route, "to the most suitable point above the narrows of new River, in the State of Virginia," and to construct and operate branch roads to bring out coal, iron and other ores, etc., from Botetourt, Craig, Roanoke, Giles, Bland, Tazewell, Russell, Wise, Buchanan, Montgomery, Pulaski, Wythe, Carroll, Grayson, Smyth and Washington Counties, and to acquire and use land for mining and manufacturing purposes, etc.

Virginia Mineral & Gypsum R. Co., charter amended changing name to Virginia Iron Trunk R. Co. and granting authority to construct railway from, at or near mouth of Catawba or Craig creeks in Botetourt, through Botetourt, Craig, Giles, Bland, Tazewell and Russell counties, passing near Bickley's mills, on Saltville & Coal Mine R., and thence down Clinch river or through Big Moccasin Gap, in Scott county, to Tenn. line, with power to extend its road to Lexington, Va., and to build 10-mile branch roads to mineral lands, and to own and work mineral lands.

East River R. Co. of W. Va., authorized to construct parts of its line in Va. and to extend it by any route it may select and from either end or both ends of its line in W. Va. to any points in Giles, Tazewell, Buchanan and Dickenson counties, and granting the privilege of consolidating, by change of name or otherwise, with the Norfolk & Western R., the New River R. Co. of Va. and the New River R. Co. of W. Va.—but it may not consolidate with any parallel or competing line.

Virginia & West Virginia Railroad Company incorporated to construct a railway from any point on W. Va. line in Frederick or Shenandoah counties and thence to Alexandria or any point above it on the Potomac. If it does not connect with the Manassas Gap Railroad., then Winchester is to be a point on its line. May consolidate with any railway in W. Va., Va., or Md., and may build branches of any gauge as much as 20 miles long.

Fauquier & Rappahannock Railroad Company incorporated to construct a railway from any point on Va. Midland Railroad or branches to Sperryville, Rappahannock county, running to or within a mile of Washington, the county seat of that county.

Allegheny Railroad Extension Company incorporated to construct a railway from any point on the main line or branches of Richmond & Allegheny Railroad west of Lynchburg to any point or points on W. Va. state line via Craig Creek or Jackson River, or any tributary of James River, with authority to consolidate with Richmond & Allegheny Railroad, and with any railway wholly or partly in W. Va. that will form a connecting line of railway with the Allegheny Extension Railroad.

Massanutton & North Mountain Railroad Company, incorporated for constructing a railway through Warren, Page, Shenandoah, Rockingham, Augusta, Bath and Highland counties from some point on Manassas Branch of Virginia Midland Railroad between Strasburg and Riverton through the Massanutton Mountain to New Market, thence via Brock's Gap to the West Virginia line, with authority to construct branches of any gauge up to 50 miles in length.

James River & Blackwater Railroad and Lumber Company, incorporated with power to construct a traffic railway from near Proctor's bridge, of Blackwater River, Isle of Wight County, to James River, at or near Burwell's Bay, with branches of 20 miles.

Farmville & Staunton River Railroad Company, incorporated to construct a railroad from Farmville, by or near Hampden Sidney College and through Charlotte County to Staunton River at or below Brookneal.

CONTRACTS LET.

ELEVATOR CONTRACT LET.—Messrs. McIntosh & McInnes, of Halifax, N. S., have received intimation that their tender for the erection of an elevator at the Intercolonial Railway terminus at West's Wharf for about $19,000 has been accepted. Rhodes & Curry, of Amherst, have the trestle-work at about $22,000, and Corston the shed and wharf at $14,000.

CONTRACTS FOR IRON ROOFS LET.—A Washington note of the 12th says: Bids were opened to-day in Supervising Architect Hill's office for iron roofs for the public building at Topeka, Kansas. The contract will be awarded to the Missouri Bridge and Iron Works. Their bid was $21,080.

GOVERNMENT CONTRACTS LET.—Contracts for supplying hardware to the Treasury Department for the next fiscal year have been awarded to E. J. Brooks & Co. and A. Hammacher, of New York, and Frank P. Mary & Co., James B. Lambie, and Joseph L. Savage, of Washington, D. C., and for fuel to GeorgeCrevelling and John Miller, of Washington, D. C.

BUILDINGS.

BUILDING OPERATIONS IN PARIS are reported to have assumed enormous proportions. The new buildings are of an expensive character.

THE House bill providing for the erection of a public building at Brooklyn, which passed the Senate to-day, is the bill reported to the House in February last by Representative J. Hyatt Smith, from the Committee on Public Buildings and Grounds, and which passed the House on June 5. The bill as it passed both houses of Congress authorizes the purchase of as it eand erection of a suitable building, with fire-proof vaults, for the accommodation of the Post Office, internal revenue offices, and other Government offices, at a cost, for site and building complete, not to exceed $800,000.

THE TEXAS STATE-HOUSE.—Bids for the building of the new Texas State-house were received at the office of Taylor, Babcock & Co., yesterday, and examined by Hon. C. B. Farwell and other members of the syndicate. About a dozen propositions were received from architects at Austin, Tex., St. Louis, Chicago, and Boston, most of them being backed by responsible capitalists. None of the bids were satisfactory in regard to the foundations and preliminary stages of the work and none was accepted. The gentlemen interested thought the work could be done cheaper than any of the bidders' submitted propositions, and they decided to take it in hand themselves. The bids for portions of the edifice were more satisfactory and will be held in abeyance for some time. Col. Abner Taylor stated to a reporter for *The Times*, last night, that the syndicate would probably carry on the work for a year, when they would advertise for new bids to complete the edifice.

SCHOOL BUILDING IN WASHINGTON.—Congress has appropriated $9,600 for erecting three new school buildings in the district. The law requires that the contracts shall be made before Sept. 1 next.

BIDS WANTED FOR SCHOOL-HOUSES.—Northampton, Mass., wants bids for two new brick school-houses.

LABOR.

THE granite trade in Denver, Col., is very dull, there being only about twelve granite cutters employed in that city at present cutting flagging, but the soft stone trade seems to be booming. It is said there are about 250 stonecutters in Denver, almost all of whom are working on the stone work of large buildings and by large contractors, and over 200 of whom belong to the stonecutters' association. They demanded $4 per day and eight hours, which were granted by the employers. A committee of five met the employers, and the matter was amicably adjusted without a strike. One employer said to a reporter: "The men are not pushed as they are in some cities, but allowed to move along at a good honest rate, as their inclination leads them. They are treated like gentlemen. I never saw a more liberal lot of bosses in my life. Wages are steady at $4, and there has been no talk of cutting them down. In some places the bosses are always conspiring to reduce wages every chance they get."—*Granite-Cutters' Journal.*

THERE are 16,000 men in Florida now engaged in railroad building, such as grading and track-laying.

BRIDGES.

NEW BRIDGE.—An iron railroad bridge to cost $12,000 has been commenced at Three Rivers, Mich.

THE covered wooden bridge over the highway at Elli station, 14 miles from Boston on the New York & New England Railroad, was burned on the 11th. Loss between $3,000 and $4,000.

THE Commissioners of Middletown, O., have at last concluded to repair the river bridge. An iron span 180 ft. long will be attached to the wooden structure, and the work begun at once. Mr. James Cunningham has the contract for the stone work.

MISCELLANEOUS.

Two hundred thousand dollars were paid for the Allentown, Pa., rolling-mill, which was recently sold at auction.

Letters-patent have been issued incorporating Redmond Brough, civil engineer; Henry O'Brien, barrister-at-law; Thomas Dill, mechanical engineer; Wm. A. Brown, civil engineer, and Robt. Roddy, clerk of the corporation of Toronto, all of the city of Toronto, for the purpose of acquiring and working patents for improvements in railway rails, plant, and supply, and for the construction and manufacture of such rails, plant, and supplies throughout the Dominion of Canada, by the name of the "Canadian Patent Rail Joint Supply Co.," with a capital stock of $20,000.